Cranfield University

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Developing Customer Responsive Supply Chain Strategy: An Empirical Investigation of the Relationship between Market Segmentation and Supply Chain Strategy

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ABSTRACT

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The concept of the 'supply chain', rather than a set of independent functions, has been around for more than 25 years. Despite its theoretical longevity, many organisations still struggle to make the supply chain a reality. The supply chain is an integral part of business strategy and is the means by which customer demand is fulfilled. Alignment between marketing and supply chain strategy is critical to fulfilling customer demand in a cost-effective way. This is the primary objective of customer responsive supply chain strategy (CRSC). Over the last 10 years, research into CRSC strategy has primarily been focused on two different academic perspectives: the synthesis of lean and agile thinking, and strategic alignment. The resulting frameworks are prescriptive in their nature and not sensitive to the context-specific nature of supply chain management; a field of study that is hindered by a lack of consensual definition, limited empirical evidence, and studies limited in scope to dyadic relationships. The opportunity therefore exists to carry out empirical research that reaches beyond the dyad, looking at the development of CRSC strategy − the basis for this study being the relationship between market segmentation and supply chain strategy.

The research design that was developed to address this opportunity was a multiple case study design. This provides the opportunity to look for theoretical replication of the guiding principles and generative mechanisms that underpin the development of CRSC strategy. The rigour of the research design was improved by the use of a five stage (define research parameters, instrument development, data gathering, data analysis, dissemination & theory development), three phase research design (pilot case, core cases, cross-case comparison). The research was based on the study of three contrasting supply chains, from the perspective of the focal firm. The focal firms included a small UK manufacturer of toiletry and detergent products, a large leading logistics provider (LLP) managing the European supply chain operations for a global electronics manufacturer, and a large UK retailer of health and beauty products. An important aspect of the research design is its boundary spanning nature. It crosses a minimum of two organisational boundaries and includes at least three different organisations within a given supply chain. A process-orientated unit of analysis is used based on the supply chain operations reference (SCOR®) model to consider the conversion of demand into supply across the supply chain. The primary research instrument is semi-structured interviews with secondary documentary sources being used for data triangulation where appropriate.

The research concluded that traditional methods of segmentation (e.g. by sales value) do not provide a natural link to supply chain strategy and limit customer responsiveness. The challenge for management is to identify the right bases for customer segmentation that enable it to drive supply chain strategy. The primary output of the research was a framework for developing CRSC strategy. Concepts key to developing CRSC strategy and included within the model are: contextual drivers, supply chain strategy drivers and internal mechanisms.

ACKNOWLEDGEMENTS

I recently read an article in a Sunday newspaper condemning authors for the self-indulgent way in which they chose to write the acknowledgements for their books. It was deemed vain and somewhat sycophantic to thank everyone from the local hairdresser to the pet dog for their contribution. I have of course written a thesis, not a book and being an engineer, I am predisposed to brevity. Notwithstanding there are a number of people whom I wish to acknowledge for without them I would not have completed my PhD.

Firstly I would like to thank my supervisor Alan Harrison for his tireless support. He was instrumental not only in my conversion from industry to academia but also my registration for a PhD. He has supported me throughout the journey and taken in his stride the other major output of my doctoral studies, two baby boys. Special thanks also go to our group project manager, Lynne Hudston. Lynne has helped me in countless ways from arranging travel for fieldwork to formatting my thesis and for that I am eternally grateful. The support of Heather Simpkins as proof reader should also be recognised. She has helped me understand just how bad my understanding of English grammar really is.

My final acknowledgements are to my family. It is indulgent possibly even selfish to try and complete a PhD when you have a young family. I have tried to balance work and family life but have not always succeeded. Their love and understanding is most appreciated and I hope someday that I can repay their generosity. My thanks therefore to my husband Harry, my children (Fiona, Tennyson and Bartholomew), my Aunt Janet and my au pair Marija.

Janet Godsell
Cranfield School of Management
April, 2008

Tennyson, aged 5, 2nd April 2008

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1 Introduction

1.1 Research Rationale

'The greatest improvement in the productive powers of labour, and the greater part of the skill, dexterity, and judgment with which it is anywhere directed, or applied, seem to have been the effects of the division of labour.'

Adam Smith (1776)

Adam Smith (1776) argued that the specialisation of cooperative labour in specific, circumscribed tasks and roles would increase the efficiency of output. The 'division of labour' (DOL) was widely adopted in the UK in the Victorian era to increase the efficiency of output. It was these principles that Henry Ford capitalised on when designing the production line for the Ford Model T in 1908. Whilst Ford also became famous for his 'welfare capitalism' approach by reducing the working week and increasing hourly pay he was adamantly opposed to labour unions. This is somewhat ironic as the principles of job specialisation upon which his manufacturing processes were initially formed supported the formation of groups or guilds of specialised craftsman. The concern with such groups is that they would seek to maximise their own throughput but not necessarily the throughput of the factory.

The principles of 'scientific management' (SM) were direct attempts to abolish the craft guild system by applying a deterministic philosophy to business operations. Whilst these principles were adopted by pioneers such as Josiah Wedgwood[1] as early as 1772, it was not until the early 20th century that they came of age when they were popularised by Frederick W. Taylor (1911) and became known as 'Taylorisms'. The framework of SM introduced by Taylor was one of production quotas enforced by new pay and personnel systems, designed to require workers to meet scientifically determined work standards which were well above the then-accepted norms. Indeed, Henry Ford adopted some of these principles as he 'experimented' to optimise the output from his pioneering continuous moving assembly lines[2]. To quote Henry Ford (1924):

'By aid of scientific study one man is now able to do somewhat more than four did only a comparatively few years ago.'

In such a way Ford sought to ensure that the output of the individual was balanced with the output of the factory. Mass production, the offspring of the union between the DOL and SM approaches, was heralded as a major advance in manufacturing strategy delivering reasonably priced, reliable and efficient products. However, mass production always had the potential for employee exploitation and it was not long before the system was abused. The monotony, potential for physical injury, low flexibility and

[1] Founder of Wedgwood pottery in 1759 and known as 'the father of English potters'.
[2] Henry Ford introduced the first continuous moving assembly line whereby the line operators remained stationary and the work flowed to them, hence regulating the amount of time they had to complete a specialised task.

poor robustness of the approach were exacerbated and resulted in sweat shops with de-skilled staff, powerless to respond to overbearing management obsessed with the volume of output regardless of quality or range (Hoxie, 1915; Ford and Crowther, 1924; Slack et al., 1998). By the mid-1970s this was the situation facing many western manufacturing companies. Furthermore, the unholistic, divisive and mechanistic approach created such animosity between 'white collar' management and 'blue collar' workers that the guilds of craftsman of the turn of the century were replaced by powerful labour unions. Furthermore, the 'mass' approach presented increasingly discerning consumers with a limited range of poor quality goods for which there was no market.

Paradoxically as western companies were failing to connect with their customers, Japanese companies who had previously found these markets impenetrable started to find success. To quote the founder of Matsushita Electronics, Konosuke Matsushita in 1988:

'We will win, and you will lose. You cannot do anything about it as failure is an internal disease. Your companies are based on Taylor's principles. Worse, your heads are Taylorised, too.'

The Japanese had a more holistic approach to manufacturing strategy based on delivery of the 'highest quality, at the lowest cost with the shortest lead time' – a goal made famous by the Toyota Production System (TPS). The TPS was essentially built upon the principles of the DOL and SM. Thus Toyota developed these principles into the next generation philosophies Just in Time (JIT)[3] and Jidoka[4] – together with supporting tools and techniques for their implementation – in the post war era.

Ironically, it was the American economist Deming (1950) who played a pivotal role in ensuring this quality centric and holistic approach to manufacturing strategy was widely adopted in post-war Japan. It was based on principles of constancy of purpose, equality, co-operation, process robustness, continuous improvement and sound leadership, and was encapsulated in Deming's 14 key principles for management (Deming, 1982; 1986). The 9th of these principles states:

'Break down barriers between departments. Abolish competition and build a win-win system of cooperation within the organization. People in research, design, sales, and production must work as a team to foresee problems of production and use that might be encountered with the product or service.'

Whilst this appears to be straightforward and sound advice, many organisations have struggled to remove the 'white space' that exists between functions on the organisation chart. To quote Tomasko (1994) p12:

[3] An inventory strategy implemented to improve the return on investment of a business by reducing in-process inventory and its associated costs.

[4] Also known as 'autonomation' - it means "automation with a human touch." Jidoka involves the automatic detection of errors or defects during production. When a defect is detected the halting of the production forces immediate attention to the problem.

'Everyone in middle and senior management is concerned only with protecting and growing their particular piece of turf.'

However, such a lack of coordination led Hammer (1993) to comment that such companies (p65):

'…lose sight of larger objectives. They may measure each worker's ability to handle individual tasks, but they never look at the efficiency, cost and purpose of an entire process.'

Whilst discord can occur between any two functions within an organisation, as highlighted by Clare (1984) the relationship between marketing and manufacturing (p163) has the

'greater potential for conflict and dominance than cooperation'

This tension may occur because marketing and manufacturing must converge to make decisions that impact directly on the customer (Crittenden et al., 1993) and as a result also has the maximum impact on the customer and can potentially jeopardise the firm's survival in the marketplace (Mukhopadhyay and Gupta, 1998). It is therefore not surprising that the marketing/manufacturing interface has been of interest to both academics and industrialists alike for over three decades and many of the issues remain unresolved. Furthermore, having worked in a number of operational roles in both the pharmaceutical and domestic appliance industries for over 10 years the author has experienced this conflict at first hand, and manufacturing always appeared to be the 'poor relation' of sales and marketing. Thus when presented with an opportunity to embark on a doctoral research project, it was natural to explore this relationship in more detail, to try and identify the ways in which the strategic 'trade-offs'[5] that can occur at this organisational interface can be resolved for the benefit of customers and shareholders alike. For instance, during a time working for Dyson[6], marketing believed that on one particular product variant it was very important to include a sticker that detailed all the awards that the product had received on the front of the vacuum cleaner. This sticker was long, narrow and difficult to apply. It cost 12p and required an extra operator on the line to apply. It was also the most common cause of internal visual quality failures, and additional labour was required to reapply the sticker to the required standard. Initial discussions around this issue reached an impasse as marketing insisted that it had to be included. A decision was then taken to talk to the end consumers and retail customers. From these discussions it was discovered that the sticker was of little value to the customer and the first thing that many customers did was to remove it. Therefore a decision was made to eliminate this operation. The net effect was to improve product quality and reduce cost with no impact on the end consumer. A win:win solution to what had been an adversarial trade-off or even stand-off!

[5] Trade-off: taken to its extreme implies that improvement in manufacturing performance can only be gained at the expense of performance in marketing.

[6] Dyson: The domestic appliance design and manufacturing company, famous for its revolutionary cyclonic vacuum cleaner.

During time spent in industry the author experienced first hand the way in which this interface was changing, moving from a marketing:manufacturing interface issue to one of a demand creation:demand fulfilment (DCDF) alignment issue. In this sense it is the broader interface between sales and marketing (the mechanism for creating demand) and the supply chain (the mechanism for fulfilling demand) that is important. As Hess (2004) p521 states:

'Firms must divide their resources, employees, and capital between gathering information about consumers (identifying "the right thing to do") and developing the supply chain capabilities to produce effectively whatever product is thought to be the best (doing it right).'[7]

Hess's concept of the 'right thing to do' versus 'doing it right' is at the heart of this interface, and it is obvious that the 'right thing to do' for one customer, will not necessarily be the same for another. This has an impact on the supply chain as it attempts to fulfil demand by 'doing it right', suggesting that there will be more than one way of 'doing it right'. The focus for this doctoral research builds upon this trade-off and explores the impact of different customer buying behaviours on supply chain strategy development.

The focus for this introductory chapter is to lay the foundations for the main body of this thesis, by providing firstly the background knowledge necessary to contextualise the study, and secondly a route map of this thesis. The background knowledge necessary to contextualise this work is covered in section 1.2 Underpinning Literature and focuses on two bodies of literature: the marketing:manufacturing interface and evolution of manufacturing to supply chain strategy. Section 1.3 then presents a thesis route map which covers the research agenda and thesis structure. Each chapter begins with a diagram that summarises the chapter structure, and ends with a set of conclusions. The structure for this chapter is summarised in figure 1-1.

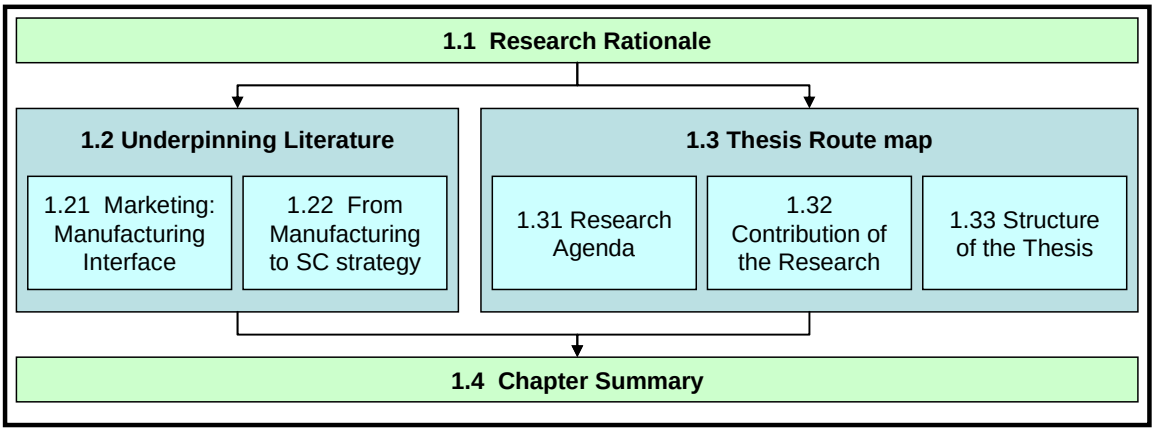

Figure 1-1: Structure for Chapter 1 (Introduction)

[7] The author has substituted the words 'supply chain' for the word 'manufacturing' which was used in the original quote

1.2 Underpinning Literature

1.2.1 The Marketing: Manufacturing Interface

One of the inhibitors of research into manufacturing strategy has been the lack of consensus in the way that language is used (Gunasekaran and Ngai, 2005; Power, 2005; Burgess et al., 2006; Tan, 2001/3). This same issue therefore exists when looking at the interface between manufacturing and marketing. Whilst it could be argued that 'labels' are not important, it is important to know what terms are currently being used and the similarities and differences between them.

The first major contributor to terminology was Shapiro (1977) who coined the term 'marketing/manufacturing interface' (p104) to describe:

'…the areas of necessary cooperation but potential conflict …between the marketing and manufacturing functions.'

This view was also adopted by Sawhney (2002) who specifically references Shapiro and uses the term Marketing-Operations Interface or MOI (p259) to describe:

'…the interface between marketing and operations…'

Rho, Ham and Yu (1994) use the term 'interface congruence' (p28) which is defined as:

'…the degree of consensus between two addressed groups, especially manufacturing and marketing groups for our study, on cross-departmental decision problems which occur at their interface.'

This definition is essentially the same but uses the word 'consensus' instead of 'cooperation' and 'decision problems' instead of 'conflict'. A broader perspective is taken by Christopher (1997) who uses the term 'marketing logistics' (p1) to define:

'…the critical interface between the market place and the organization seeking to satisfy customer requirements.'

This definition focuses less on the dynamics of how the interface operates and more on what it should seek to achieve. It goes beyond the boundaries of the functions, and focuses on the interface between the DCDF processes.

Given the large degree of synergy between these definitions, and the strong focus on the need for cooperation rather than conflict, it is not surprising that this interface has long been considered as:

'The focal point of much more frequent and heated disagreement than occurs between other pairs of functions' (Hayes and Wheelwright, 1979) p199.

In fact *'The conflict between marketing and manufacturing in a manufacturing company can often be so dysfunctional that the day-to-day abrasion can lead to open warfare.'* (Shapiro, 1977) p104

It is therefore not surprising that Hill (1985) p37 believes that:

'A great business divide therefore separates the two realities of market-place and manufacturing.'

Furthermore, as the velocity of change in the external business environment increases, the more the integrative and strategic aspects of the marketing:manufacturing interface have escalated in importance (D'Aveni et al., 1995; Eisenhardt and Brown, 1998; Hahn et al., 1994). It is also not surprising that issues exist between these functions as manufacturing operates as a cost centre that seeks lower costs and efficient scale economies whilst marketing seeks to increase sales (Fry et al., 1994; Graves and Keilson, 1981; Mukhopadhyay and Gupta, 1998). However, whilst this might appear to be the main source of strategic tension between the two functions, it can be decomposed into a number of different dimensions at an operational level. In fact Shapiro (1977) cites seven problem areas of marketing:manufacturing conflict which range from capacity planning and long-range sales forecasting to cost control and breadth of product line. Whilst this was the first and arguably the most enduring categorisation, others do exist. Crittenden, Gardiner and Stam (1993) perceive that there are three main areas of conflict that require management, namely diversity, conformity and dependability. However, as illustrated in table 1-1 there is commonality between these different taxonomies.

As time has passed, scholars and commentators have been more specific about the factors that they believe have the most significant impact on the relationship. For instance, Crittenden (1991; 1992) believes that the major form of conflict between marketing and manufacturing falls in 'managing conformity', of how manufacturing allocates capacity. Others indirectly support this view, as there has been significant emphasis on the requirement for factories to become 'flexible' (Hill and Chambers, 1991; Calantone et al., 2002/6; Vickery et al., 1999; Singh et al., 2005; Upton, 1995) which in essence enables the factory to respond quickly and economically to the dynamic market changes and potentially reduce capacity allocation conflict. However, O'Leary-Kelly and Flores (2002/6) in their empirical study found that business performance increased when marketing and manufacturing worked together regarding planning decisions, but not when making capacity allocation decisions. The argument is one of timing and that it is better for manufacturing to make decisions in advance based on the marketing/sales plan than to wait for the capacity plan when it might well be too late.

Problem Area		Typical Marketing Comment	Typical Manufacturing Comment
Shapiro	**Crittenden et al. Managing…**		
Capacity planning and long-range sales forecasting.	Conformity	'Why don't we have enough capacity?	"Why didn't we have accurate sales forecasts?''
Production scheduling and short-range sales forecasting	Conformity	'We need faster response. Our lead times are ridiculous'	We need realistic customer commitments and sales forecasts that don't change like the wind'
Delivery and physical distribution	Dependability	'Why don't we ever have the right merchandise in inventory?'	'We can't keep everything in inventory'
Quality assurance	Dependability	'Why can't we have reasonable quality at reasonable cost?'	'Why must we always offer options that are too hard to manufacture and offer little customer utility?'
Breadth of product line	Diversity	'Our customers demand variety'	'The product line is too broad so all we get are short, uneconomical runs'
Cost control	Conformity	'Our costs are so high that we are not competitive in the marketplace'	'We can't provide fast delivery, broad variety, rapid response to change and high quality at low cost'
New product introduction	Diversity	'New products are our life blood'	'Unnecessary design changes are prohibitively expensive'
Adjunct services such as spare parts inventory support, installation and repair	Diversity	'Field service costs are too high'	'Products are being used in ways for which they weren't designed'

Table 1-1: Marketing/manufacturing areas of necessary co-operation but potential conflict (after Shapiro (1977) and Crittenden *et. al.* (1993))

Whilst an understanding of the operational levers is important to try and resolve the day-to-day manifestations of this conflict, it does little to answer the strategic question: why, if this issue is so difficult to resolve, do organisations not just accept it as an inevitable part of doing business? Most commentators on this subject do believe that mutually established (or aligned) marketing:manufacturing competitive capabilities and priorities produce improved business performance (Adam and Swamidass, 1989; Karmarkar, 1996; Miller and Roth, 1994; Anderson et al., 1989; Berry et al., 1991/8; Deane et al., 1991/8; Fitzsimmons et al., 1991; Leong et al., 1990). Furthermore there is a growing body of empirical evidence to support this view. In their study Hausman, Montgomery and Roth (2002) p252 say:

'…empirically demonstrate that business performance is enhanced when marketing and manufacturing work harmoniously together for goal attainment.'

In their empirical study, Vickery, Calantone and Droge (1999) found that the ability for a supply chain to rapidly adjust capacity to align with increasing or decreasing demand was highly correlated with measures of financial performance (i.e., Return on Investment (ROI) and Return on Sales (ROS)) and was also highly related to market share and market share growth. This was a view shared by Sawhney and Piper (2002) who, through empirical research in the PCB[8] industry, demonstrated that the effective

[8] PCB - Printed Circuit Board

interface between marketing and operations is a significant contributor to improved service and quality.

However, an alternative view is beginning to emerge. In their proof of concept paper, Balasubramanian and Bhardwaj (2004) p500 demonstrate that:

'Creative induction and leverage of such conflict can serve shareholders better than perfect interdepartmental coordination can.'

As with all extremes there are those who also adopt the 'middle ground' position such as Xie, Song and Stringfellow (1998) p204 who suggest that:

'…avoiding inter functional conflict decreases new product success and that resolving conflict via collaborative methods increases new product success' and that senior management need to *'encourage marketing, R&D, and manufacturing to exchange complete and accurate information and emphasize common interest'.*

However, what is common to all these perspectives is that such conflict whilst it should not necessarily be avoided needs to be resolved. The operational mechanisms identified earlier attempt to treat the symptoms but fail to address the underlying cause. Hill (1985; 1989) was among the first who tried to address this issue directly at the strategic level with his 5-step framework for linking manufacturing to marketing with corporate strategy development (table 1-2).

Steps
1. Define corporate objectives
2. Determine marketing strategies to meet these objectives
3. Assess how different products qualify in their respective markets and win orders against competitors
4. Establish the appropriate process to manufacture these products (process choice)
5. Provide the manufacturing infrastructure to support production

Table 1-2: The steps to help link manufacturing to marketing with corporate strategy development (Hill, 1985; 1989)

In this framework, Hill (1985; 1989) articulated the need for manufacturing strategy to be driven by marketing strategy which in turn was driven by corporate strategy. However, Hill stresses that this is an iterative process as the factors can be inter-dependent and hence impact upon each other.

Whilst Hill's framework has emerged in this thesis through an exploration of the marketing:manufacturing interface, Hill's intent was not specifically to achieve 'interface congruence'. Although this was an invaluable by-product, the key aim was to outline an approach to manufacturing strategy development. His contribution was to start to bring together two key elements that underpin this doctoral thesis:

1. Coordination of the marketing:manufacturing interface
2. The articulation of manufacturing strategy development, which the author has extended into supply chain strategy development

This section has explored the first of these debates. The following section addresses the second.

1.2.2 From Manufacturing to Supply Chain Strategy

1.2.2.1 Linking Corporate and Manufacturing Strategy

Hill's 5-step model made the link between manufacturing and corporate strategy but it was not the first to do so. In fact there is widespread agreement that modern manufacturing strategy was founded in the late 1960's when Skinner (1969) made the link between manufacturing and corporate strategy. Over time, in addition to Hill (1985; 1989) this has been a view echoed by many prominent scholars such as Hayes (1979; 1984), Buffa (1984) and Fine (1985). Such has been the level of interest in the subject that it has also been the focus for a number of comprehensive meta-level literature reviews such as Anderson, Cleveland and Schroeder (1989) and Leong, Snyder and Ward (1990). The Leong et al. (1990) paper is particularly relevant to this doctoral study as it distils the contribution of the key conversants into a predominant process model (PPM) of manufacturing strategy. As illustrated in figure 1-2, whilst Hill's 5-step model is clearly recognisable, the PPM is broader in its scope considering the elements required not only for successful strategy formulation but also those for implementation.

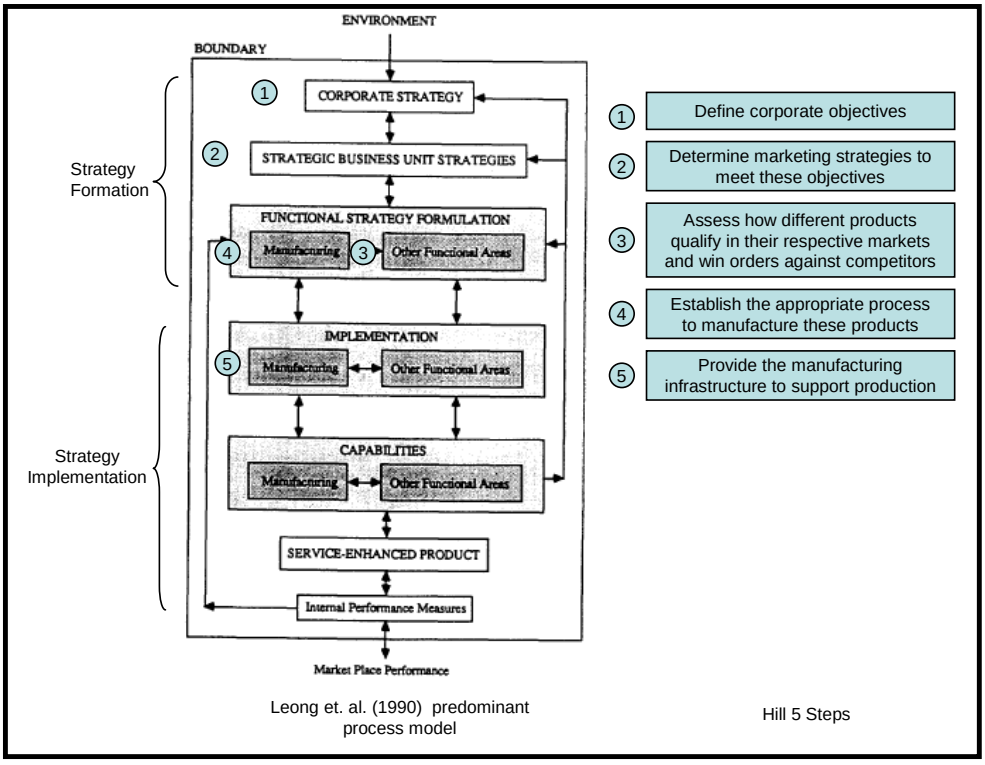

Figure 1-2: A comparison of the PPM of manufacturing (Leong et al., 1990) with Hill's 5-Step model (Hill, 1985)

The strategy formulation aspect of figure 1-2 is particularly useful for framing this doctoral study as it defines this process but in an expanded supply chain context that the author aims to explore.

1.2.2.2 The Evolution of the Product: Process Choice Matrix

In addition to exploring the link between manufacturing and corporate strategy, Skinner also wrestled with the challenge of balancing the customer need for increased variety with the operational requirement to maximise efficiency. Skinner's (1974) solution was the 'focused factory', i.e. factories, or units within factories, dedicated to meeting the needs of a limited set of customer needs. Whilst he did not articulate it as such, Skinner was essentially suggesting a differentiated approach to manufacturing strategy, whereby different factories/units within factories met the needs of different customer buying behaviours.

Five years later the next major contribution to this debate was made by Hayes and Wheelwright (1979). They believed that manufacturing strategy was an important element of corporate strategy formulation. They proposed that the formal top-down approach needed to be balanced with a bottom-up assessment of functional capability. This logic also applies to the alignment of the DCDF processes. The top-down customer requirements need to be balanced with the bottom-up organisational capability to meet their needs. Their suggestion that manufacturing process choice could be linked to the product life cycle and the resultant product-process matrix, recommending a diagonal path of best fit revolutionised manufacturing strategy (Refer to figure 1-3). They suggested a product attribute centred approach to the development of manufacturing strategy that was to go unchallenged for almost 20 years.

Figure 1-3: Matching major stages in product and process life cycles (Hayes and Wheelwright, 1979)

There have been many restatements of this matrix. One of the most popular has been developed by Slack, Chambers, Harland, Harrison and Johnston (1998) who reconfigured the matrix so that the axes represented volume and variety (with a scale from low to high) and the diagonal the same series of process choices from job shop to continuous flow as illustrated in figure 1-4.

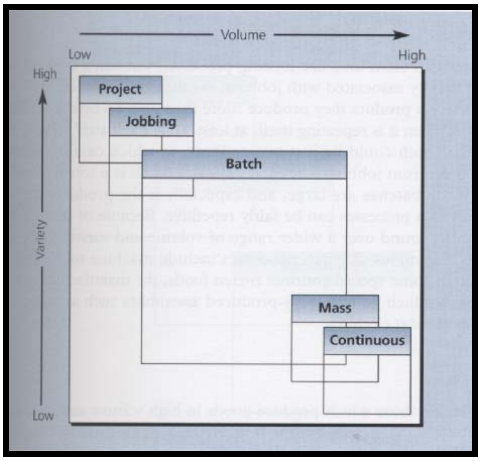

Figure 1-4: Process types in manufacturing operations (Slack et al., 1998)

From a manufacturing strategy perspective the objective was therefore one of developing manufacturing processes that 'match' the characteristics of the products they make. For instance, the production of made-to-order custom-built sports cars has a relatively low volume of production but has the potential for near infinite variety. The best type of manufacturing process for this type of product is a jobbing process. Alternatively a mass production process was preferred for the production of the Ford Model T where the volume was high and there was only one model type. However, this continuum was not exclusive and though companies may seek a position 'off the diagonal' to their competitive advantage, as Hayes & Wheelwright (1979) p135 suggest:

'A company that allows itself to drift from the diagonal without understanding the likely implications of such a shift is asking for trouble.'

The key is to understand the positioning of product:process combinations and not allow them to strategically 'drift off the diagonal' as a product matures. In this way the optimal manufacturing strategy for a particular product is assured. Such views were echoed by a number of key conversants and explicitly embedded within their manufacturing strategy frameworks. For example Fine and Hax (1985) and Hill (1985).

Sweeney (1991) raised a concern about the static nature of the Hayes & Wheelwright (1979) model because p7:

'It does not include an explanation of how to manage the transition from one strategic role to another.'

Sweeney's solution was a taxonomy of manufacturing strategies that companies could migrate through, depending on their competitive priorities, that brought together the results of preceding taxonomies (De Meyer, 1990; Edmondson and Wheelwright, 1989; Miller and Roth, 1994; Roth and Miller, 1989; Stobaugh and Telesio, 1983) and his own empirical research (Sweeney, 1990).

Sweeney (1991) believed p7:

'A taxonomy is the means for establishing a conceptual link between the range of generic competitive strategies used by companies and the role that manufacturing must fulfil to support each type'.

He proposes four types of generic manufacturing strategy as summarised and illustrated in figure 1-5.

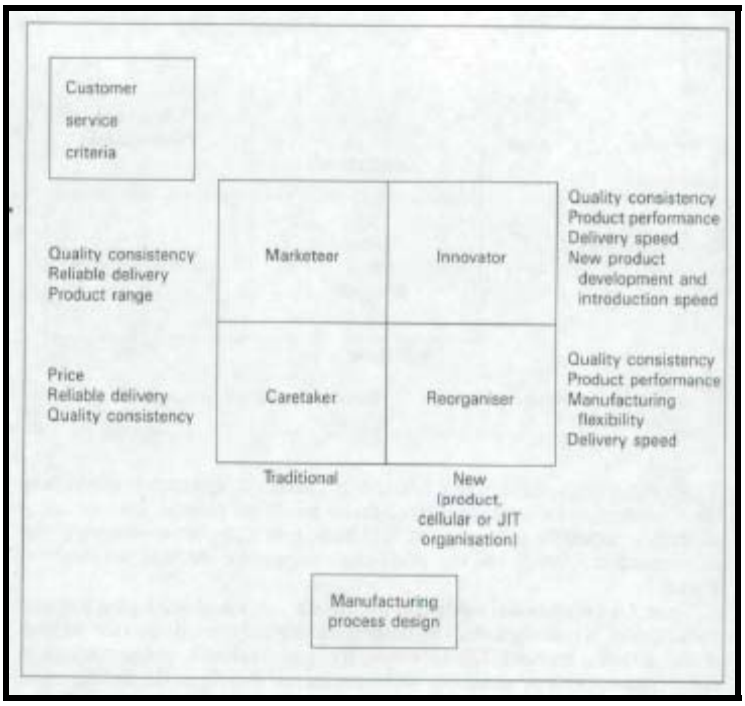

Figure 1-5: The relationship between generic manufacturing strategy and competitive strategy (Sweeney, 1991)

This concern about the static nature of manufacturing strategy became increasingly important as the late 1980's and early 1990's were increasingly characterised by turbulence (Pine II, 1993) as markets fragmented and demand became more uncertain in terms of time, form and place (Bowerscox and Closs, 1996). Furthermore, to quote D'Aveni (1995) p46:

'Market stability is threatened by short product life cycles, new technologies, frequent entry by unexpected outsiders, repositioning by incumbents, and radical redefinitions of market boundaries as diverse industries merge. In other words, environments escalate toward higher and higher levels of uncertainty, dynamism, heterogeneity of the players, and hostility.'

As a result, the concept of 'matching' product and process types was developed to deal with this increasingly dynamic environment. Boynton and Victor (1991) coined the term 'dynamic stability' to describe the new challenge that organisations faced, arguing that the key to success in this environment was for organisations to become 'dynamically stable':

'…firms designed to serve the widest range of customers and changing product demands ('dynamic') while building on existing process capabilities, experience and knowledge ('stable')…'

Based on this concept a product:process change matrix was developed (Pine II, 1993; Boynton and Victor, 1991) as illustrated in figure 1-6.

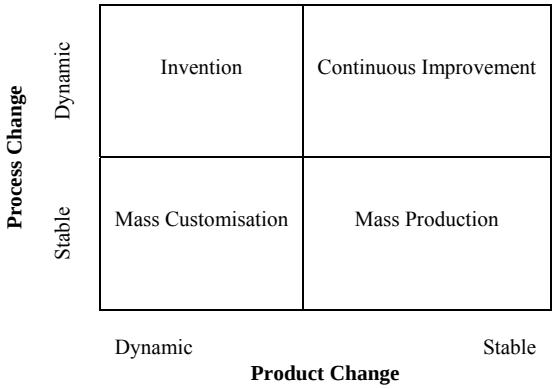

Figure 1-6: Product-Process Change Matrix (Pine II, 1993)

Rather than suggesting a continuum of options, this matrix suggests a range of different manufacturing strategies depending on the circumstances and stage of the product life cycle. A typical life cycle path would include the introduction of a new product with an 'invention' strategy. As and when sales of the new product grow to sufficient volume the organisation may reduce costs and increase efficiency through 'mass production'. As the product matures and the market fragments, the organisation may meet these needs through a number of iterations of 'continuous improvement' en route to a strategy of 'mass customisation'.

However, even in the late 1990's whilst some sought to extend the product:process matrix, for instance Hill, Menda and Dilts (1998) with their concept of product profiling (Hill et al., 1998) or the generic manufacturing strategies model of Devaraj, Hollingworth & Schroeder (2001/7), these concepts were seen as extensions to, rather than replacements of, this foundation of manufacturing strategy. At this time the concept of supply chain management was gaining more momentum and there was a shift in emphasis encapsulated by both Christopher and Gossman, vice president of AlliedSignal, (cited in (Vickery et al., 1999)) who share the view that:

'Competition is no longer company to company, but supply chain to supply chain.'

What appeared at first to be a simple statement had strategic implications that were much further reaching, as it extended the question of strategic choice from one of product:process choice to one of product: supply chain. (Christopher, 1992; Fisher, 1997; Naylor et al., 1999). Fisher's (1997) seminal article proposed a match between efficient supply chains and functional products and responsive supply chains and innovative products. Other supply chain, product combinations are deemed a mismatch. Refer to figure 1-7.

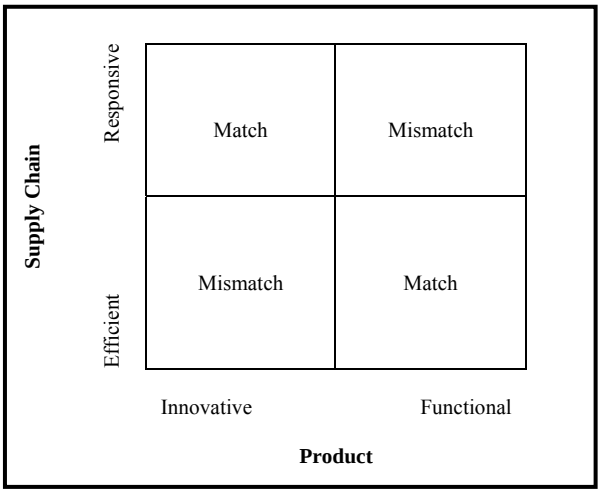

Figure 1-7: Matching Supply Chains with Products (Fisher, 1997)

Early quantitative studies designed to test this hypothesis found that there was no correlation between business performance and the degree of match or mismatch (Selldin and Olhager, 2002; 2007). These results were not totally surprising as whilst the product may have been the appropriate lens around which to develop manufacturing strategy, it did not follow that it was the right lens through which to develop supply chain strategy. The supply chain is the mechanism for fulfilling customer demand, therefore it logically follows that the starting place for developing supply chain strategy is with the customer. Whilst Hill (1985) saw the benefit of linking marketing and manufacturing strategy, the vehicle he used for this coupling was the product and not the customer.

1.3 Thesis Route Map

The studies for this thesis can be decomposed into three key elements that provide a route map of the journey. The first is a research agenda description, which provides the platform for the second element – a description of the contribution to knowledge that the studies seek to make. The third and final element is more mechanistic and provides an overview of the structure of the thesis. Each of these three elements is now considered in turn.

1.3.1 The Research Agenda

Having reviewed the development of supply chain strategy (Fisher, 1997) from its manufacturing roots (Pine II, 1993; Boynton and Victor, 1991; Hayes and Wheelwright, 1979; Hill, 1985; Skinner, 1969), what has become apparent is that the predominant logic for the segmentation of both manufacturing and, more recently, supply chain

strategy has been product attributes. What is also beginning to emerge from empirical research is the ineffectiveness of this approach (Selldin and Olhager, 2002), which is not surprising as supply chain strategy seeks to fulfil 'customer' and not 'product' demand. The author has first hand experience of the pitfalls of product segmentation having been a technical support engineer with duties that included procuring engineering spares. When procuring spares for routine stock replenishment, given a specified level of quality, price was the key driver and lead time was practically irrelevant. On one occasion following a plant shutdown, a pump had been replaced as part of routine preventative maintenance. One week after shutdown, the pump failed and production stopped so it was necessary to procure a replacement. Whilst the same specified level of quality remained, price was not an option but lead time became crucial. Hence for the same product, given a change in context the decisions around which the purchase decision was based totally changed. The implication for the pump suppliers is that they may need different supply chain strategies to effectively meet different buying behaviours, to minimise cost and maximise customer service. Given that different buying behaviours exist, this suggests that the organisation needs to be able to understand what the different buying behaviours are and segment customers accordingly. These segments can then be used as the starting point for developing what effectively becomes a multi-stranded or differentiated supply chain strategy. Such an approach has two potential benefits:

1. It forces the organisation to focus on 'customer-creating value satisfactions' rather than providing products and increases customer reponsiveness (Levit, 1960).
2. Provides a natural and logical link between marketing and supply chain strategy that directly bridges the marketing : supply chain divide

The research agenda for this thesis seeks to explore the relationship between market segmentation and supply chain strategy. In particular, the premise that developing a differentiated supply chain strategy in response to specific customer segments increases customer responsiveness.

1.3.2 Contribution of the Research

This thesis aims to test and extend existing theory on customer responsive supply chain strategy formulation. As the previous discussion has shown, this is underpinned by literature exploring the marketing:manufacturing interface and manufacturing strategy. Hence, given the immaturity of the field, it is by considering the shortcomings in these more established areas of research that the contribution to the newly emerging field of customer responsive supply chain can be identified as illustrated in figure 1-8. Each of these 2 underpinning areas is now considered in turn.

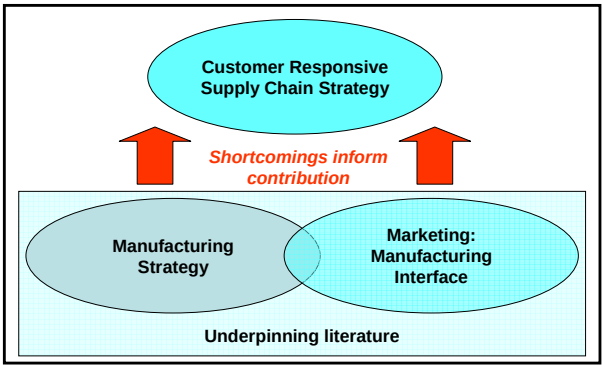

Figure 1-8: Contribution to doctoral studies evolving from underpinning literature

1.3.2.1 Contribution evolving from manufacturing strategy

In 1990 manufacturing strategy was considered to be a young and emerging field (Leong et al., 1990), and the same can be said for supply chain strategy in 2008. Research into supply chain strategy is suffering from many of the same shortcomings, for instance:

1. The field has not been fully defined and there are several alternative definitions from the literature, which has resulted in theoretical papers that review those alternative definitions (Gunasekaran and Ngai, 2005; Power, 2005; Burgess et al., 2006; Tan, 2001/3).

2. Research is predominantly theoretical and there is a paucity of empirical supply chain based studies.

3. Research has tended to focus on dyadic relationships rather than the broader supply chain. This is one of the reasons why the International Journal of Supply Chain Management has changed its editorial policy and will now only accept articles which look beyond the dyad as their unit of analysis.

All three of these issues are potentially addressed through the research design. Steps taken in these doctoral studies to address these shortcomings were:

Shortcoming 1 – alternative definitions
One element of the research design specifically looked at the role of language and the common understanding of the term 'supply chain management' across the supply chains studied.

Shortcoming 2 – lack of empirical research
The study was designed to both test and extend existing supply chain strategy literature through field based empirical research using a case study methodology.

Shortcoming 3 – dyadic focus
The study was designed to look at at least four organisational echelons that typically included supplier, focal firm, logistics provider and customer.

1.3.2.2 Contribution evolving from marketing: manufacturing interface

The main opportunity that the current literature identifies for research in this area is for empirical research which explores the strategic interface between marketing and supply chain testing and extending current theory. Parente (1998) in perhaps the most extensive literature review of the manufacturing:marketing interface suggests there is (p1215):

'An opening for research on how the process is conducted between the manufacturing-marketing interface.'

Walters (1999) goes further in articulating the way in which this interface should be explored, suggesting a case based approach focused on organisational decision making. He suggests that (p256):

'Attitudes and perceptions of both marketing and operations management towards each other, and of their roles in the strategy process, would identify behavioural issues and result in case study evidence of how strategic performance may be enhanced by closer integration.'

Building on these views, this doctoral study seeks to use a case based approach to explore the way in which the organisational decisions that are taken, relating to market segmentation strategy, impact on the decisions that are taken to formulate supply chain strategy. Furthermore, in a more inductive way they also seek to identify the factors which enable or inhibit these decision making processes.

1.3.3 Structure of the Thesis

This thesis has a relatively conventional structure, which is illustrated in figure 1-9.

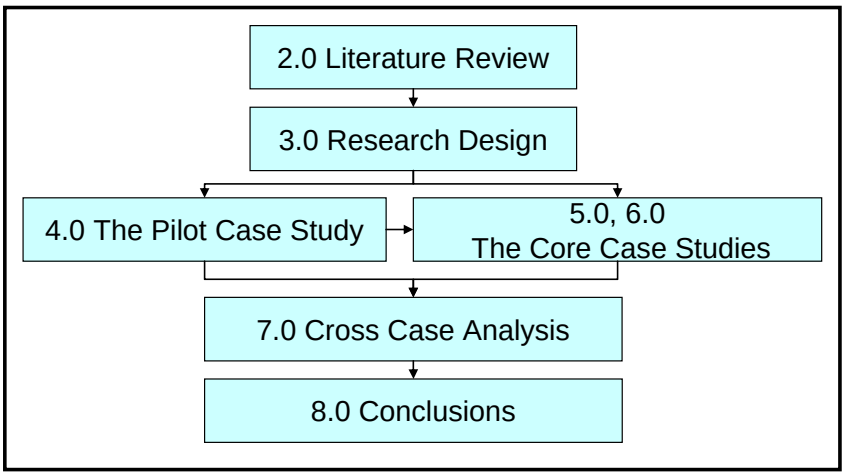

Figure 1-9: Summary of Thesis Structure

Having considered the underpinning literature in this introductory chapter, Chapter 2 focuses more directly on the existing literature on customer responsive supply chain strategy. It considers the current state from both a marketing and supply chain perspective and identifies four key themes which inform this research. Chapter 3 positions these themes as part of a broader research design. It begins with a discussion of the author's ontological perspective and the way in which this aligns with the case based approach favoured for this research. Given the immaturity of this field of study,

Chapter 4 presents a pilot case study (CleanCo) that was used to refine and develop the methodology. Chapters 5 and 6 describe the two core cases 4PLElecCo and PharmaCo respectively. The results of the pilot and core cases are then compared in Chapter 7 – cross-case comparison. The thesis ends with Chapter 8, which analyses the implications and contribution of the research, and the impact on future research into customer responsive supply chain strategy.

1.4 Chapter Summary

This introductory chapter served two primary purposes.

1. To present the underpinning rationale of the study
2. To provide an overview of the route map for this thesis

To achieve the first of these objectives, this chapter began by describing the business importance of aligning marketing and manufacturing strategies. It then went on to explain why this concept of alignment needs to be extended beyond the bounds of conventional manufacturing to include the broader supply chain. It described how the traditional product-centric approach to developing supply chain strategy is becoming increasingly questionable and that there is a need for a new customer-centric approach in order to connect a supply chain with the customers it serves.

In terms of the second objective, this chapter presented an overview of how the research agenda emerged from the underpinning literature and how, by referencing this more mature literature, the specific contribution of the research could be identified. The third aspect of the route map presented was an overview of the thesis structure.

2 Literature Review

2.1 Introduction

'*…the entire corporation must be viewed as a customer-creating and customer-satisfying organism. Management must think of itself not as producing products but us providing customer-creating value satisfactions'*

Levitt (1960) p56

Levitt's (1960) seminal paper 'Marketing Myopia' sought to expose the limitations of product and production orientated strategies. He encouraged industry to develop 'backwards' and begin by considering the physical delivery of customer satisfaction. Levitt was essentially challenging industry to develop a customer responsive supply chain (CRSC) strategy; an approach more than 40 years on that industrialists still struggle to fully embrace. This thesis seeks to explore one aspect of CRSC strategy – the way in which organisational decisions relating to market segmentation strategy impact on decisions to formulate supply chain strategy. The purpose of the literature review is to:

1. Review the literature that defines customer responsive supply chain strategy development
2. Explore the links between market segmentation and supply chain strategy
3. Understand the contribution and limitations of the current literature to this study

The structure of the literature section reflects these objectives and is summarised in figure 2-1. The definition of CRSC is developed over sections 2.2 and 2.3. Section 2.2 begins by defining the terms supply chain, supply chain management and why the author favours the use of the term alignment rather than integration. Section 2.3 discusses both the underpinning philosophies of customer responsiveness and segmentation as a means of operationalisation. Section 2.4 pulls these two concepts together in a review of CSRC strategy formulation. This chapter closes with a summary (section 2.5) that draws together both the contribution to and limitations of current literature.

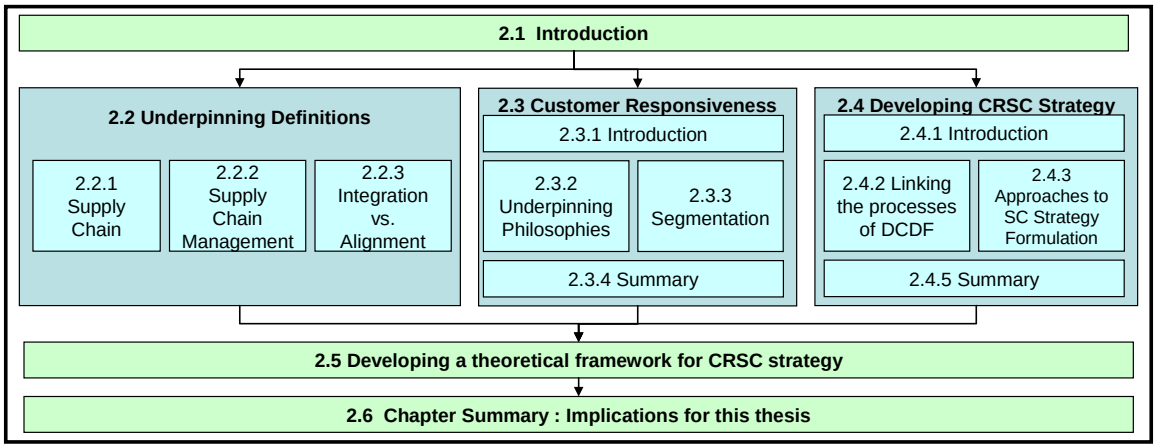

Figure 2-1: Structure for Chapter 2 (Literature Review)

2.2 Underpinning Definitions

2.2.1 Supply Chain

The concept of the supply chain came to prominence in the 1980's. The first reference was by Oliver & Weber (1982) p66 who viewed the supply chain as:

'…a single entity rather that relegating fragmented responsibility for various segments in the supply chain to functional areas such as purchasing, manufacturing, distribution and sales'[9]

This was a view echoed in Porter's (1985) 'value chain', representing a firm as a (p36):

'Collection of activities that are performed to design, market, deliver and support its product'

Analogous to Oliver & Weber, Porter identified the core value chain activities of inbound logistics, operations, outbound logistics, marketing and sales, and service. Furthermore, he classified procurement, technology development, human resource management and firm infrastructure as support activities. The Supply Chain Council[10] has subsequently defined the industry standard around five core supply chain processes – Plan, Source, Make, Deliver and Return which form the backbone of the Supply Chain Operations Reference model (SCOR®)[11]. Combining the relevant elements of the value chain and SCOR, figure 2-2 depicts a conceptualisation of the internal[12] supply chain and indicates which parts are relevant to this thesis.

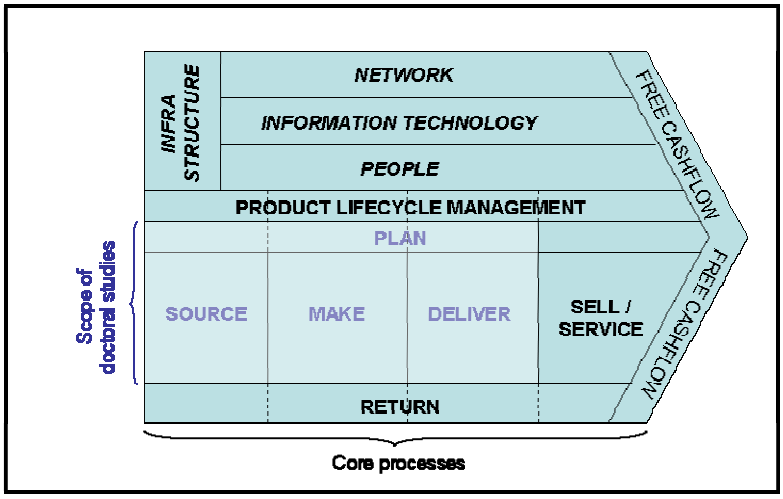

Figure 2-2: Internal Supply Chain and Scope of this thesis

[9] 3 years later Houlihan (1985) produced a word for word identical definition. In fact the text of pages 22-27 of the paper are identical to those of pages 63-68 of the Oliver & Weber (1982) paper but no reference is made to the earlier work.

[10] Formed in 1996 as an independent not for profits organisation (refer to web site: www.supply-chain.org)

[11] This model has been developed by the SCC as the cross-industry standard

[12] Within the bounds of the firm i.e. between 1st supplier and 1st customer

The author's study focuses on the four forward facing[13] core supply chain processes (Plan-Source-Make-Deliver) and their interaction with the elements of the other core processes (Sell/Service and Product Life Cycle Management) that define customer value and hence drive the supply chain.

Porter (1985) also believed that the value chain of an individual firm was part of a broader *'value system'* or in today's parlance – extended supply chain – which included the value chains of suppliers, channels and buyers. He thus mirrored Galbraith (1983) and his conceptualisation of an extended chain from raw materials through to the retailer. Whilst the Galbraith view is echoed theoretically by many organisations who talk of 'seed to smoke' (tobacco) or 'grass to grass' (milk) strategies such a broad scope or wide 'arc of integration' (Frohlich and Westbrook, 2001/2) is difficult to manage. A more pragmatic stance is reflected in SCOR (Supply Chain Council, 2006) which covers (p3):

'All product (physical material and service) transactions from your supplier's supplier to your customer's customer, including equipment, supplies, spare parts, bulk product, software etc.'

Given that the majority of supply chain empirical studies have progressed beyond the dyad this would be an ambitious scope for this thesis. Therefore a more focused view has been taken, limiting the scope from 'supplier to customer' as illustrated in figure 2-3. It is important to note the focus on the business to business (B2B) relationships between companies in the supply chain. The business to consumer (B2C) link at the start of the chain is beyond the scope of the studies for this thesis.

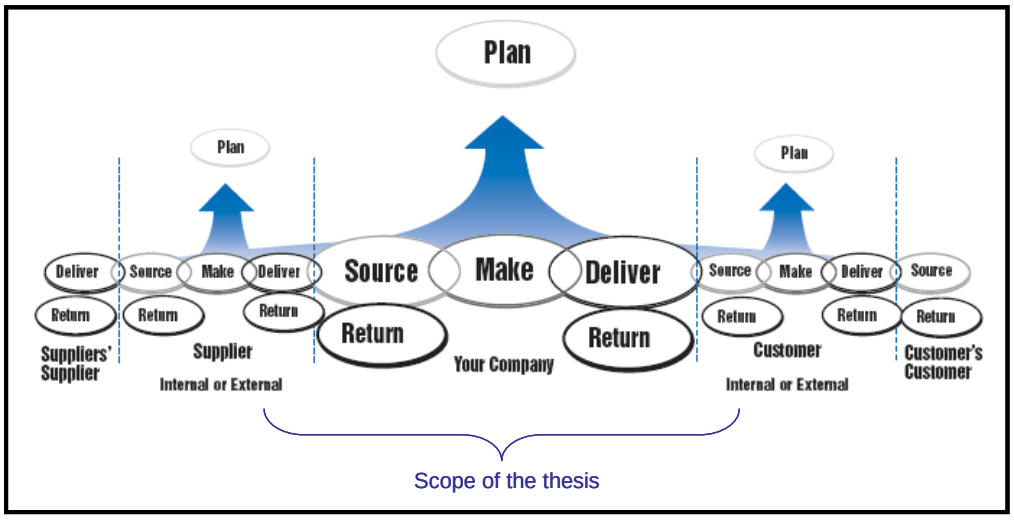

Figure 2-3: The Extended Supply Chain and Scope of the thesis

In addition to these seminal works there have been many attempts at defining the supply chain. Whilst there are some subtle differences between the competing definitions, the core concepts are the same. Indeed there is greater consensus in defining the supply

[13] There is a backward facing process – Return – but this is outside the scope of the author's research which is focused on the forward facing processes

chain rather than the more abstract of what it means to actually manage the supply chain (Mentzer et al., 2001). Perhaps this is due to the strong and convergent rooting of the seminal papers in strategy - competitive strategy (Porter, 1985) and strategic decision making (Houlihan, 1985; Oliver and Weber, 1982). The relevant issue for this thesis is scope, which will focus on the core supply chain processes of 'Plan-Source-Make-Deliver' from the 'customer to supplier' of the focal firm.

2.2.2 Supply Chain Management

Defining supply chain management is much more problematic. Indicative of the field's immature nature, the discipline lacks 'consensual definition' clearly evidenced in a recent literature review by Burgess, Singh & Koroglu (2006) p715 who found that:

'…only a quarter of the authors used existing definitions, and within this subgroup there was no clear convergence on a single definition'

Such confusion is inevitable given the multitude of angles from which the discipline can be explored. It has been explored from both the functional perspectives of purchasing (Giunipero and Brand, 1996; Harland, 1996; Larson and Halldorsson, 2002) and logistics (Christopher, 1992; Harrison and Van Hoek, 2002; Lummus et al., 2001; Skjoett-Larsen, 1999) though perhaps has remained more detached from the manufacturing perspective. Tan (2001/3) approached the subject by combining the functional perspective of logistics and purchasing. Strategy and theory development (Chen and Paulraj, 2004; Croom et al., 2000; Giannakis and Croom, 2004) has proved another popular avenue for exploration. A further complication of functionally biased exploration is terminology proliferation. New terminology is introduced to complement or substitute SCM. A good example of such a term is supply management. Used most commonly to reflect the increasingly strategic role of purchasing[14] within the supply chain (Cousins et al., 2006; Giunipero et al., 2006) in a more strategic context, supply strategy has been used as an alternative to supply chain strategy (1999). This type of academic debate whilst usually well constructed and stimulating to the academic is a further indication of immaturity.

The immature nature of SCM reaches beyond terminology. It is often depicted as a series of idealised characteristics which bear little resemblance to reality (Storey et al., 2006) as illustrated in figure 2-4. Informally, as part of the author's teaching activities, over 100 practitioners[15] have been asked if companies they have worked in demonstrate these idealised characteristics and it was found that no company demonstrates more than three, and usually then it is debatable.

[14] Or Buy in SCOR terminology
[15] Business executives, MBA and MSc Logistics & SCM students

1	Seamless flow from initial source(s) to final customer
2	Demand-led supply chain (only produce what is pulled through)
3	Shared information across the whole chain (end to end pipeline visibility)
4	Collaboration and partnership (mutual gains and added value for all; win-win; joint learning and joint design and development)
5	IT enabled
6	All products direct to shelf
7	Batch/ pack size configured to rate of sale
8	Customer responsive
9	Agile and lean
10	Mass customisation
11	Market segmentation

Figure 2-4: Idealised supply management characteristics (Storey et al., 2006)

Given the broad debate on this subject, and with only minor modifications[16], the definition of Lambert, Cooper & Pagh (1998) p1 who cite a definition of supply chain management originally defined in 1994 and refined in 1998 by the members of the Global Supply Chain Forum[17] has been adopted.

'Supply chain management is the alignment of key business processes (Plan-Source-Make-Deliver) from customer through original suppliers that provides products, services, and information that add value for customers and other stakeholders'

The main reason for adopting this definition is that it aligned well with the author's scope of the supply chain. More specifically it:

- Starts with the customer
- Is process orientated (fits well with SCOR)
- Encompasses products, services and information
- Focuses on value-add to customers and other stakeholders

2.2.3 Integration vs. Alignment

Two of the first commentators, Lawrence & Lorsch (1969) defined integration as:

'The quality of the state of collaboration that exists among departments that is required to achieve unity of effort by the demands of the environment'

This definition was originally used in an internal context, but has been extended beyond the firm and encompasses the external entities in a supply chain. Bagchi and Skjoett-Larsen (2002) p92 state that:

'Organizational integration encourages partners to become more entrenched members of the network and instils a sense of belonging to the supply chain…true organizational

[16] The changes made are 2-fold. Firstly the word alignment has been substituted for integration. The rationale for this change will be explained in section 2.2.3. The other changes made are to align the definition with the scope described in section 2.2.1. This included describing the relevant SC processes (Plan-Source-Make-Deliver) and limiting the scope to customer and not end customer.

[17] Previously the Research Roundtable of the International Centre for Competitive Excellence, University of North Florida. This group moved with Dr. Lambert to the Ohio State University in 1996 and became the Global Supply Chain Forum.

integration thus paves the way for individual members of the chain to behave more like one unified entity sharing ideas, skills and culture alike'

Bagchi et al. (2002) p8 also subscribe to Schewchuk's (1998) 'one size does not fit all' and contextualise this definition by stating that:

'Supply chain integration is not a question of "high integration fits all". The degree of integration depends on a number of situational factors'

This suggests that there may be a range or perhaps even continuum of different types of integration depending on the context. Mason, Doyle & Wong (2006) p140 concur with this view believing that:

'Supply chain configurations are increasingly disintermediated, adopting partial or quasi-integration rather than pursuing more traditional, full vertical integration. Quasi-integration allows firms to maximize their ability to quickly adapt to changing market / customer demands'

Going back to the basic building blocks or organisational theory, are these terms nothing more than a way of expressing different types of interdependency between the actors in the supply chain? Thompson (1967) pp54-56 identifies three types of interdependency:

- *Pooled* – partners share and use common resources
- *Sequential* – partners work in series and the output from one becomes the input to the next
- *Reciprocal* – outputs of each becomes the inputs for others, so that each partner poses contingency for the other and contingency takes place by mutual adjustment.

Koulikoff & Harrison (2007) p10 apply this categorisation to a dyadic buyer-supplier relationship, and believe that:

'Sequential interdependency describes the traditional, unidirectional view of buyer-supplier coordination (source → make → deliver). Reciprocal interdependency describes bi-directional coordination (source ⇔ make ⇔ deliver)'

This categorisation can be extended beyond the scope of the dyad to the whole of the supply chain. It could be argued that the role of supply chain management is to manage the interdependencies not only of the individual interfaces but across the end to end supply chain. This concurs with the views of Christopher, Lowson & Peck (2004) p372 who state that:

'…Process alignment is…the ability to create "seamless" or "boundaryless" connections, in other words there are no delays caused by hand-offs or buffers between the different stages in the chain and transactions are likely to be paperless'

Alignment is also the preferred term of Malhotra & Sharma (2002/6). In their introduction to the Journal of Operations Management 2002 special edition on spanning

the continuum between marketing and operations they highlighted three main alignment challenges for operations and marketing:

1) goals and objectives of marketing and manufacturing functions
2) product pricing and manufacturing costs
3) channels of distribution and manufacturing

They also identified supply chain issues and their interaction with servicing different market segments citing that:

'Such an approach might allow us to form segments that can be served more efficiently along the entire value chain'

This concurs with the author's views on CRSC strategy but also brings us back to the concept of the value chain. Porter (1985) p48 also believed that the value chain was held together by a series of interdependencies or in his terminology:

'Linkages are relationships between the way one value activity is performed and the cost or performance of another'

Porter states that one of the key mechanisms for delivering competitive advantage is the ability to co-ordinate linkages as this is the way in which the costs can be reduced and value enhanced. Porter (1985 p50) also recognised that:

'...though linkages within the value chain are crucial to competitive advantage, they often go unrecognized…' and *'…Managing linkages thus is a more complex task than managing value activities themselves'*

There therefore appears to be consensus that the key to successful supply chain management (SCM) is the ability to co-ordinate or manage the interface or linkage between the different parties within the chain to maximise the transfer of value at minimum cost. Integration and alignment are different approaches to configuring the supply chain to meet this objective though there is some confusion as to how they differ. The Oxford English dictionary (OED) provides some clarity on this issue. Fröhlich and Westbrook (2002/11) used the OED definition of integration

'To make into a whole'

In contrast the OED defines align as:

'To place or arrange in a straight line or into correct relative positions'

As illustrated in figure 2-5, (b) alignment is therefore about getting the supply chain core process 'in line' with each other (internally) and with customer and suppliers externally so that value flow is maximised and value losses minimised. This is analogous to the quasi-integration state described by Mason et al. (2006). Integration takes this one step further and seeks to make the supply chain processes 'whole'. This requires co-ownership of the process boundaries both internally and externally and is a

less flexible approach. It also takes longer to develop. Realistically it will only be possible to achieve integration with a handful of customers and suppliers as it is likely in the absence of global standards that processes and systems will vary.

On balance, given the changeable patterns of consumption referred to above, it is proposed that the first priority of a supply chain (SC) is to seek alignment and once that has been achieved consider the evolution to full integration. Hence use of the term alignment rather than integration is favoured in this study.

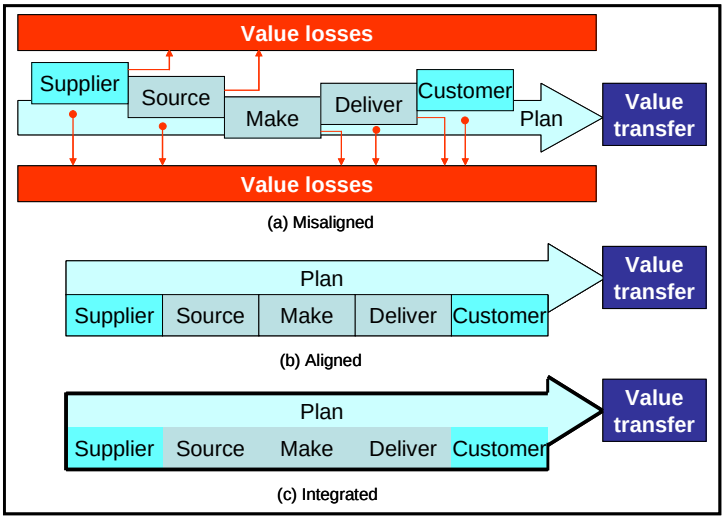

Figure 2-5: The contrast between SC alignment and integration

The studies for this thesis are an exploration of CRSC strategy. With the concepts of the SC and SCM described and bounded, attention must now turn to the notion of customer responsiveness.

2.3 Customer Responsiveness

2.3.1 Introduction

There is little doubt that the new millennium has seen significant changes in the culture of consumption. The cash rich, time poor consumer 'shopping on speed' (Foxall et al., 1998) p244 is searching for the perfect purchase from an increasingly wide range of products. Adding to the complexity, consumers increasingly do not buy products but services or even experiences (Baker, 2003; Pine II and Gilmore, 1999). Defence contractors in the age of 'servitization'[18] buy flight time not aircraft, mining companies in South Africa sell 'holes' and not 'drills'[19], and consumers seek the 'spa experience' rather than just a manicure or pedicure. In addition, the increasing marketing literacy of consumers (Baker, 2003; Mitchell, 2001), fuelled by the internet, is rapidly addressing the information asymmetry historically exploited by marketers. This has resulted in a

[18] 'Servitization' is defined by the Cranfield IMRC (2006) as "*the innovation of an organisation's capabilities and processes to better create mutual value through a shift from selling product to selling Product-Service Systems* where *a Product-Service System is an integrated product and service offering that delivers value in use"*

[19] This is an example the author originally heard used by Dan Jones as part of his keynote speech at the EUROMA conference in Bath, 2001

spectrum of responses from those who understand the rules and are willing to play along to those who use this information to their own advantage or even to express political opinion (Baker, 2003). The word consumer here is used to signify the *end* customer in a chain; the starting point from which the extended supply chain emanates. As the culture of consumption continues to evolve, this in turn requires ever increasing responsiveness from the supply chain. Surprisingly, whilst customer responsiveness is implicit in many supply chain studies it is explicitly stated in only a handful of papers[20]. Kendrick (1988) uses the term from a manufacturing perspective, Bowersox and Daugherty (1992). Daugherty et al. (1992) in a logistics context and Storey et al. (2005) encompass the supply chain. Whilst the supply chain lacks 'consensual definition' customer responsiveness does not yet have an adequate definition at all. It is however the central tenet of a number of business philosophies that seek to create a linkage between the DCDF processes, namely lean thinking (Womack and Jones, 1996; Womack et al., 1990) agility (Preiss et al., 1996; Goldman et al., 1995) quick response (Lowson, 2002; Christopher et al., 2004; Lowson et al., 1999) and market orientation (Narver and Slater, 1990; Kohli and Jaworski, 1990; Slater and Narver, 1994). In this section each of these philosophies will be explored in turn to understand their contribution to customer responsiveness. This leads on to a more in-depth exploration of the concept of 'segmentation' as a mechanism for defining the customer value against which the supply chain can respond.

2.3.2 Underpinning Philosophies

2.3.2.1 Lean Thinking

At the heart of the philosophy of 'lean thinking' (Womack and Jones, 1996; Womack et al., 1990) pp19-25 are the 5-lean principles. Namely:

1) Understand customer value
2) Develop value streams[21]
3) Make it flow
4) At the pull of the customer
5) In pursuit of perfection

Little fault can be found with these principles as a philosophy though their operationalisation is often lost behind the more widely adopted banner of 'lean' manufacturing and associated tools and techniques. Philosophically, lean thinking is about developing value streams that are driven by an understanding of customer value. However, 'lean' at a tactical level is first and foremost seen as a strategy for reducing cost by the removal of waste from the internal supply chain and the customer is often forgotten. At the heart of the 'lean' approach is the Japanese word 'heijunka' or level scheduling which as its name suggests is best suited for situations where demand is

[20] This was a search conducted in Proquest looking for the term 'customer responsive' in the title and abstract of scholarly publications

[21] Womack and Jones (1996) p414: *'apply the term 'value stream' to the entire set of activities running from raw material to finished product for a **specific product** and seek to optimise the whole from the standpoint of the **final customer'***
The value chain concept in comparison does not have such a specific product focus and explores the chain from the perspective of the focal firm.

stable. Where demand is stable, 'lean' is generally the most cost-effective strategy but it does not lend itself well to unpredictable demand (Christopher and Towill, 2000a; Mason-Jones et al., 2000; Naylor et al., 1999). From an extended supply chain perspective, 'lean' is more commonly extended to the management of the supply base rather than engagement with the customer (Rich and Hines, 1997). This seems somewhat ironic given the customer centricity of the first lean principle but probably results from the import of quality circles from the Toyota Production System in Japan.

Unfortunately 'lean thinking' has been damaged by the popularised view that equates 'lean' at a tactical level with waste and hence cost reduction. Attempts have been made by academics to rectify this situation and describe different types of lean strategies for different contexts (Hines et al., 2002a). These attempts at clarification have not been widely adopted and from a practitioner perspective cause more confusion. Hence, whilst lean may offer a potential supply chain strategy that is suitable for a stable demand pattern, it is but one strategy for an organisation in terms of customer responsiveness.

2.3.2.2 Agility

Agility emerged in the mid-1990's as a response to increasing market turbulence. In the words of Goldman, Nagel and Preiss (1995) p3:

'For a company to be agile is to be capable of operating profitably in a competitive environment of continually and unpredictable changing customer opportunities'

Agility was deemed to be context-specific and comprised the 'Four dimensions' of agile competition (Goldman et al., 1995) p73-74:

1. Enriching the customer
2. Cooperating to enhance competitiveness
3. Organizing to master change and uncertainty
4. Leveraging the impact of people and information

The concept of agility was extended to a supply chain context (Naylor et al., 1999; van Hoek et al., 2001) but the literature was sparse and limited to the provision of conceptual overviews (Gunasekaran, 1999; Yusuf et al., 1999; 2004) and preliminary empirical assessment (Sharp et al., 1999). Towards the end of the 1990's, agility was positioned as an alternative supply chain strategy to lean. Whilst some still argued the strategic superiority of the lean and agile paradigms, the more enlightened saw the opportunity to accommodate these strategic responses into more holistic frameworks (Christopher and Towill, 2000a; Mason-Jones et al., 2000; Naylor et al., 1999). Others went further and tried to discourage the use of such labels at all. Christopher & Towill (2000a) p115 contended that:

'Supply chain competitiveness is not just a question of lean or agile, or even lean and agile, but instead requires careful matching of design and operations to the needs of the marketplace'

Hence, at the heart of customer responsiveness is the ability to balance the DCDF processes. Whilst this may be operationalised through lean and/or agile supply chain

strategies, these are not the only options and it is misleading to think of supply chain strategy purely in terms of the lean and/or agile debate.

2.3.2.3 Quick Response

Quick response (QR) is considered to be an operational strategy by which agility and speed of response can be achieved. (Lowson, 2002; Christopher et al., 2004). Lowson, King & Hunter (1999) p95 define quick response as:

'A state of responsiveness and flexibility in which an organisation seeks to provide a highly diverse range of products and services to a customer in the exact quantity, variety and quality, and at the right time, place and price as dictated by real-time customer/consumer demand'

Lowson & Christopher (2004) define seven strategic foci and their implications for QR which are summarised in table 2-1. The first three of these factors – alignment of organisational activity to demand, linkages between demand and supply, and demand relationships – are particularly pertinent and are the principles upon which customer responsiveness is built.

Strategic Focus	Implications of QR
The alignment of organisational activity to demand	• All activities within an enterprise should be paced to demand and customer behaviour • Products and services are produced and delivered in the variety and volume that meet demand.
Linkages between supply and demand	• A strategic understanding of the drivers of demand and their synchronised connection with supply
Demand relationships	• Both customer/consumers are products, are dynamic, and place unique demands on the organisation • Identical products will have unique product flows depending upon customer/consumer buying behaviour
Resource configuration	• Strategic architecture is inter-organisational • Strategy and strategic thinking are at a network level, encompassing many external interconnections
Time	• Time-based competition requires careful assessment as to where it can best serve customers/consumers.
Primacy of information	• Data and information are the foundation • Timely and accurate flows will enable fast and accurate responses
Partnerships and alliances	• The recognition that performance relies increasingly upon a series of alliances and relationships with other enterprises as an effective way to deal with constantly changing market conditions

Table 2-1: Strategic Implications of QR ((Lowson, 2002; Christopher et al., 2004))

2.3.2.4 Market Orientation

A broader view of customer responsiveness is proposed by Kohli and Jaworski (1990) and the concept of market orientation, which they define as (p6):

*'The organizationwide **generation** of market intelligence pertaining to current and future customer needs, **dissemination** of the intelligence across departments, and organization **responsiveness** to it'*

This suggests that the generation, dissemination and organisational responsiveness to market intelligence are the key business activities (Kohli and Jaworski, 1990) upon

which business strategy is developed. These business activities are enabled by a number of behavioural dimensions (Narver and Slater, 1990) as shown in figure 2-6.

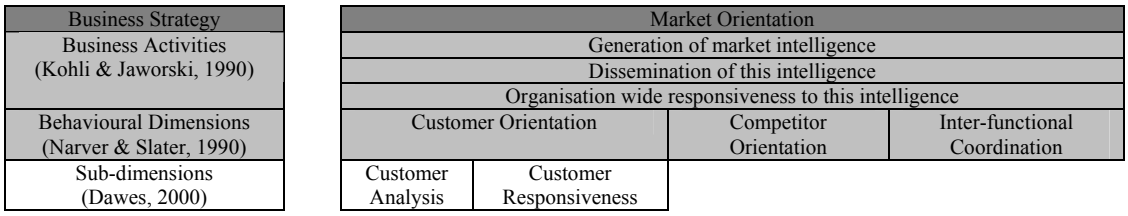

Figure 2-6: Customer Responsiveness in the Context of Market Orientation

One of the behavioural dimensions is customer orientation, which Dawes (2000) further divides into two sub-dimensions − customer analysis and customer responsiveness. In this context Dawes defines customer analysis as (p174):

'…a deliberate emphasis on understanding customer wants and needs'

and customer responsiveness as (p175):

'…responding to the information received about customer needs and preferences'

This mindset is important as it firmly places the customer at the front of the DCDF process regardless of the demand pattern and hence implicitly links market orientation to the supply chain. This link has been made more explicitly by Martin & Grbac (2003/1/1) (p 25) who argue that :

'SCM may be one way to leverage a well-developed market orientation'

and hence, as suggested by Kohli & Jaworski (1999) (p7)

'…take concrete actions in response to market intelligence. These actions relate to targeting select market segments and designing new products and programs or modifying existing ones to meet customer needs'.

Market orientation therefore stretches beyond the bounds of products or programmes to developing the right supply chain to meet the needs of select market segments. Hence the DC element of market orientation is implemented through market segmentation, the DF element through supply chain strategy and the challenge for CRSC strategy to manage the linkage between the two.

2.3.3 Market Segmentation

Market segmentation is the crucial first step in developing CRSC strategy. But what does it mean? How is it operationalised? What are its limitations? Before these aspects of segmentation are explored in more detail the author will begin by positioning market segmentation in a marketing context.

2.3.3.1 Positioning

Market segmentation, whilst it appears to be a fairly innocuous term, sits within a complex web of terms that paradoxically appear to be the same yet different. The author will therefore begin by trying to clarify the distinction between industrial and consumer marketing and the juxtaposition with industry, market and consumer segmentation.

The comparison between industrial and consumer marketing is relatively easy to distinguish. Marketing is essentially (Doyle, 2002) p61:

'a philosophy for the whole business that defines the primary goals of everyone in the organization as meeting the needs of customers…satisfied customers are seen as the only source of the firm's profit, growth and security'

Industrial marketing is therefore concerned with meeting the needs of industrial customers – who are part of another business – and the management of a B2B relationship. Consumer marketing is concerned with meeting the needs of individual consumers and the management of a B2C relationship.

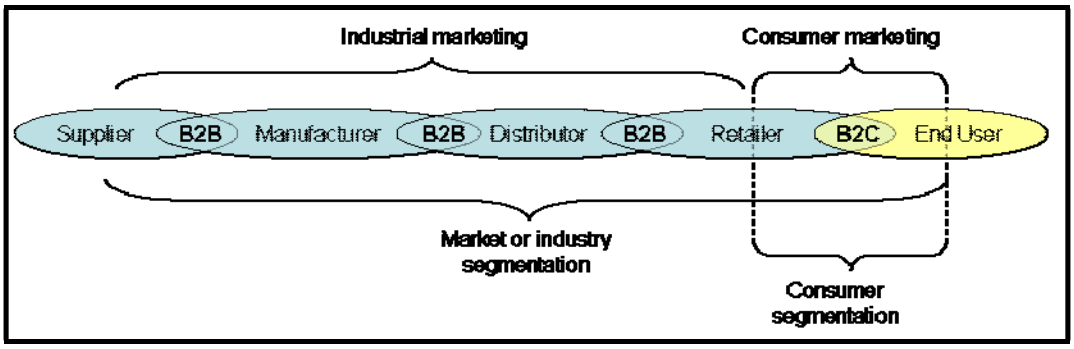

Figure 2-7: The Juxtaposition of Industrial and Consumer Marketing with Industrial, Market and Consumer Segmentation

What becomes more difficult to distinguish is the relationship between industry, market and consumer segmentation as there is not necessarily a direct one to one relationship with industrial and consumer marketing as illustrated in figure 2-7. As its name would suggest, consumer segmentation is concerned with the segmentation of consumers and hence there is a direct relationship to consumer marketing. The complication comes as it may also form part of the market or industry segmentation process and not be considered independently. This is dependent on both the bases and methods of segmentation adopted, discussed in more detail in section 2.3.3.3.

The relationship between industry and market segmentation is once again more involved. The essential difference is the starting point. Porter (1985) p233 defines an industry as:

'…a market in which similar or closely related products are sold to buyers'

whereas Piercy (2002) p411 defines industries as:

'…groups of companies linked by technology or product similarities. What we are interested in is markets. Markets are based on customer needs and demands'

Hence Porter starts with a product or service and uses industry segmentation to link to the 'buyer'. Piercy takes the 'buyer' (or in his parlance the 'customer') as the starting point and uses market segmentation to drive the development of products and services to meet the customer's needs and demands. In both cases the process is seen as dynamic, evolving and leading to segment redefinition and in fact the output is the same[22]. These relationships are summarised in figure 2-8. For consistency and ease of understanding the term 'market segmentation' is used as it reflects the customer-driven nature of this research. In terms of the scope of this thesis, this is market segmentation in its purest sense and excludes consumer segmentation.

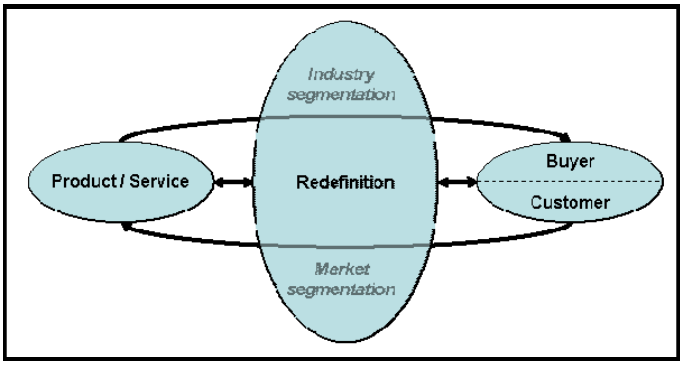

Figure 2-8: The Relationship between Industry & Market Segmentation

2.3.3.2 Definition

Whilst there are some indirect references to market segmentation from an economic perspective dating back to the 1930's the first significant reference was made by Smith (1956) p5 who said that:

'Segmentation is based upon developments on the demand side of the market and represents a rational and more precise adjustment of product and marketing effort to consumer or user requirements. In the language of the economist, segmentation is disaggregative in its effects and tends to bring about recognition of several demand schedules where only one was recognized before'

What is fascinating about this definition is its holistic nature. Smith did not seek to compartmentalise segmentation decisions to the bounds of marketing but saw it as a way to address marketing and supply chain trade-offs. Unfortunately, this broad view was soon challenged. Wind & Cardozo (1974/3) in their seminal review of approaches to industrial segmentation (p155) commented that:

[22] Piercy (2002) suggests the development of a product-customer matrix and Porter (1985) a product-buyer matrix.

'A market segment is simply a group of present or potential customers with some common characteristic which is relevant in explaining (and predicting) their response to a 'supplier's marketing stimuli'

This narrow view confines the scope of market segmentation to the realms of marketing. As illustrated in table 2-2 this stance has been maintained by the marketing community and only the strategist Porter shares Smith's broader definition.

Author	Objective	Scope
Smith (1956)	Integrated approach to the minimisation of total costs – facilitates policies affecting both production & marketing activities	Marketing & Production
Wind & Cardozo (1974/3)	Developing differentiated marketing programmes for each segment	Marketing programmes
Choffray & Lillien (1978)	Implementation of most appropriate marketing programme for each segment	Marketing programmes
Christopher (1983)	Development of segment specific customer service programmes	Customer service programmes
Shapiro & Benson (1984)	To assist companies with 1) analysis of the market 2) selection of key markets 3) management of marketing	Marketing
Porter (1985)	Identifying differences in buyer needs and purchasing behaviour to serve segments that match its capabilities with distinct marketing programmes	Marketing programmes
Porter (1985)	***Industry segmentation*** Combines buyer purchasing behaviour with the behaviour of costs (production + cost of serving different buyers)	Entire value chain
Sharma & Lambert (1990; 1994)	Segmentation of markets based on customer service requirements	Customer service
Doyle (2002)	Development of marketing plans for targeted segments	Marketing strategy

Table 2-2: A comparison of the objective and scope of market segmentation

Smith (1956) p4/5 explicitly stated why he believed the holistic approach was necessary:

'If a rational selection of strategies is to be made, an integrated approach to the minimising of total costs must take precedence over separate approaches to minimization of production costs on the one hand and marketing costs on the other. Strategy determination must be regarded as an overall management decision which will influence and require facilitating policies affecting both production and marketing activities'

Market segmentation is just one of the market choices (Piercy, 2002) or plans and decisions (Doyle, 2002) that are used to translate the customer satisfying philosophy of marketing into practice. Piercy identifies four key market choices from market definition, through segmentation, evaluation of segment attractiveness to positioning. Doyle's four decision areas are similar, though they omit the definition stage and include an additional market planning stage at the end. However, once again it is Porter (1985) the strategist who has the broadest perspective – including the full spectrum of choices, decisions and plans whose 'sphere of influence' is beyond marketing planning and includes the design of specific value streams to support the targeted segments as illustrated in table 2-3. He even considers which activities within the value stream should be segment-specific or shared.

Industry segmentation & competitive advantage (Porter, 1985)	Market choices (Piercy, 2002)	Segmentation, positioning, planning (Doyle, 2002)
Industry Segmentation (encompassing market segmentation)	Market definition	
	Market segmentation	Market segmentation
Industry segmentation and competitive	Market attractiveness	Target marketing

strategy	Market position	Market positioning
Value stream design (shared vs. specific activities)		Marketing planning

Table 2-3: Comparison of the positioning of market segmentation as part of marketing strategy

So it is not just the process of segmentation that marketers limit to the marketing function but the full range of market choices, decisions and plans. The marketing-specific literature therefore suggests that market segmentation takes place within a functional vacuum and may have little relevance to supply chain design, the links between market segmentation and supply chain design having been limited to the realms of strategy. Piercy (2002) has introduced an extended model of market segmentation which takes a more holistic view of the role of segmentation and has greater alignment with the views of Porter. This model is illustrated in figure 2-9. Marketing-specific approaches to segmentation concentrate on 'managerial segmentation' – markets segmented on classical bases and used to drive targeted marketing plans. Piercy believes that segmentation should really begin at a more strategic level where segmentation approaches are based on delivering customer benefits and their success judged by their ability to deliver sustainable competitive advantage. Delivery will only be possible if there is the organisational capability to support the chosen segmentation strategy. Piercy focuses on issues of organisational structure, information processes and corporate culture but the author would argue that the supply chain design is more important than these process enablers.

Given that this thesis aims to explore the relationship between market segmentation and supply chain strategy, with the paucity of marketing literature that makes this connection it will be interesting to see what transpires in practice. Specifically, at what level within the organisation are segmentation decisions taken, and what are the associated outcomes?

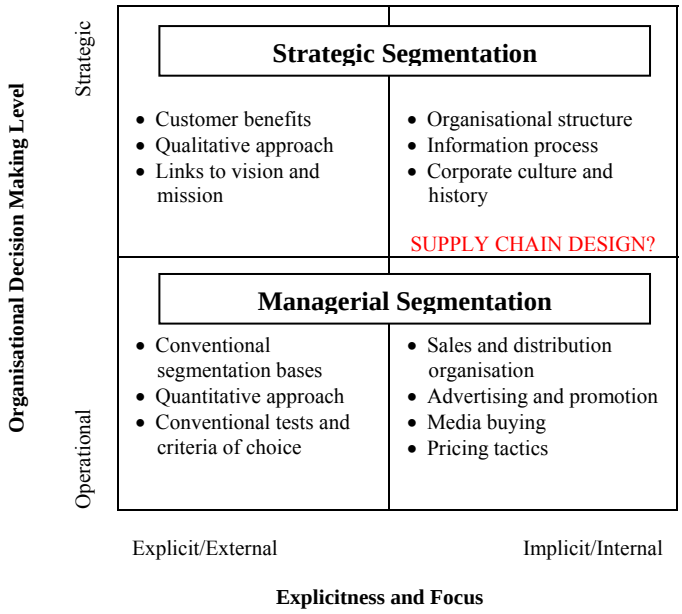

Figure 2-9: An extended model of market segmentation (Piercy, 2002)

2.3.3.3 Bases & Methods

As stated by Wedel & Kamakura (2000) p5:

*'…market segmentation is a theoretical marketing concept involving artificial groupings of customers[23] constructed to help managers design and target their strategies. Therefore, the identification of market segments and their elements is highly dependent on the **bases** (variables or criteria) and **methods** used to define them'*

The typology of bases that is commonly used was developed by Frank, Massy & Wind (1972) and classifies bases into:

- General (independent of products, services, circumstances)
- Product-specific (related to both the customer and the product/service and/or particular circumstances)
- Observable (directly measurable)
- Unobservable (inferred)

This has led to the classification of segmentation bases described above and explained in the first three columns of table 2-4. The range of bases is very wide. The method or approach to segmentation usually includes the selection of the most appropriate bases for segmentation for a given market evaluated against six criteria (Kotler, 1988; Frank et al., 1972) – identifiability, sustainability, accessibility, stability, responsiveness and actionability. These are also defined in table 2-4 and the effectiveness of the alternative bases[24] is compared (Wedel and Kamakura, 2000).

Wind & Cardozo (1974/3) proposed a 2-stage approach to segmentation:

- **Step 1**: Formation of macro-segments based on the buying organisation and situation
- **Step 2**: Dividing the macro-segments into micro-segments based on the characteristics of the decision making unit (DMU)

This approach was further developed and formalised by Choffray & Lillien (1978). Piercy (2002) also supports a two-stage approach but the focus is a little different. Step 1 = strategic segmentation and is led by customer benefits and relates to broad issues such as mission, value, strategic intent and market position. Step 2 = Managerial segmentation and is the more familiar level of managerial planning & resource allocation.

Shapiro & Benson (1984) propose a nested approach (as illustrated in figure 2-10) which could be considered as an extension of the two-stage approach into a multi-step approach (Plank, 1985). In essence what this approach tries to develop is Bonoma & Shapiro (1984) p259, who say:

[23] The word customers has been substituted for consumers to reflect the industrial marketing perspective
[24] As applied to consumer markets

'…the area of "fortuitous overlap" where "identifiable means" meets "need differences". The most useful means of segmentation involve this area of overlap; that is, segmentation management tools must be forged which encourage sound (i.e., needs-based) and implementable (i.e., external criteria driven) schemes'

Segmentation bases			Six criteria for the effectiveness & profitability of marketing strategy					
Classification	Explanation	Examples	Identifiability	Sustainability	Accessibility	Stability	Actionability	Responsiveness
			Recognition of distinct groups by using specific bases	Segment large enough to ensure profitability of targeting marketing programme	Ability to reach the targeted segments through promotional efforts	Required for time period while strategy is identified, implemented and produces results	Provides guidance for the effective specification of marketing instruments	Respond uniquely to the marketing effort targeted at them
General, observable	Independent of products, services or circumstances + measured directly	Cultural, geographic, demographic and socio-economic variables	++	++	++	++	-	-
Product specific, observable	Related to both the products, services or circumstances + measured directly	User status, usage, store loyalty and patronage, situations						
•Purchase			+	++	-	+	-	+
•Usage			+	++	+	+	-	+
General, unobservable	Independent of products, services or circumstances + inferred	Psychographics, values, personality & lifestyle						
•Personality			+/-	-	+/-	+/-	-	-
•Lifestyle			+/-	-	+/-	+/-	-	-
•Psychographics			+/-	-	+/-	+/-	-	-
Product specific, unobservable	Related to both the products, services or circumstances + inferred	Psychographics, benefits, perceptions, elasticities, attributes, preferences, intention						
•Psychographics			+/-	+	-	-	++	+/-
•Perceptions			+/-	+	-	-	+	-
•Benefits			+/-	+	-	+	++	++
•Intentions			+/-	+	-	+/-	-	++

++ Very good, + good, +/- moderate, - poor, -- very poor

Table 2-4: Classification & evaluation of segmentation bases (based on Wedel & Kamakura, 2000)

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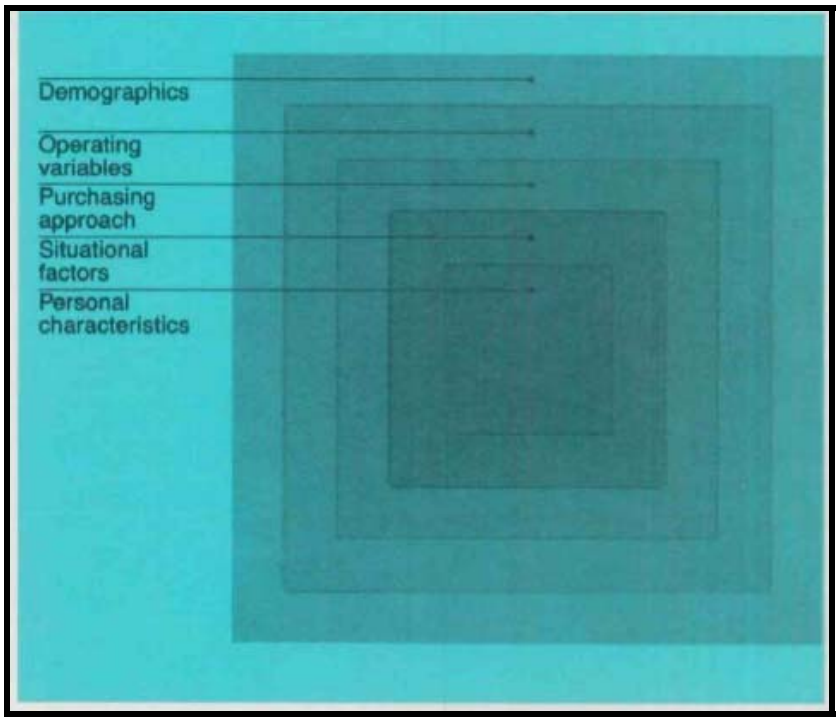


Figure 2-10: Nested approach to market segmentation (Shapiro and Bonoma, 1984)

Porter (1985) developed a process for industry segmentation as illustrated in figure 2-11. Its strength is the fact that it is a process and it gives its own tangible set of criteria (impact on industry structure and value chain) against which an array of potential segmentation criteria (product, buyer, channel and geography) can be assessed. It then seeks to describe how these criteria can be represented in a matrix format which can be combined to give one or two matrices that describe the industry.

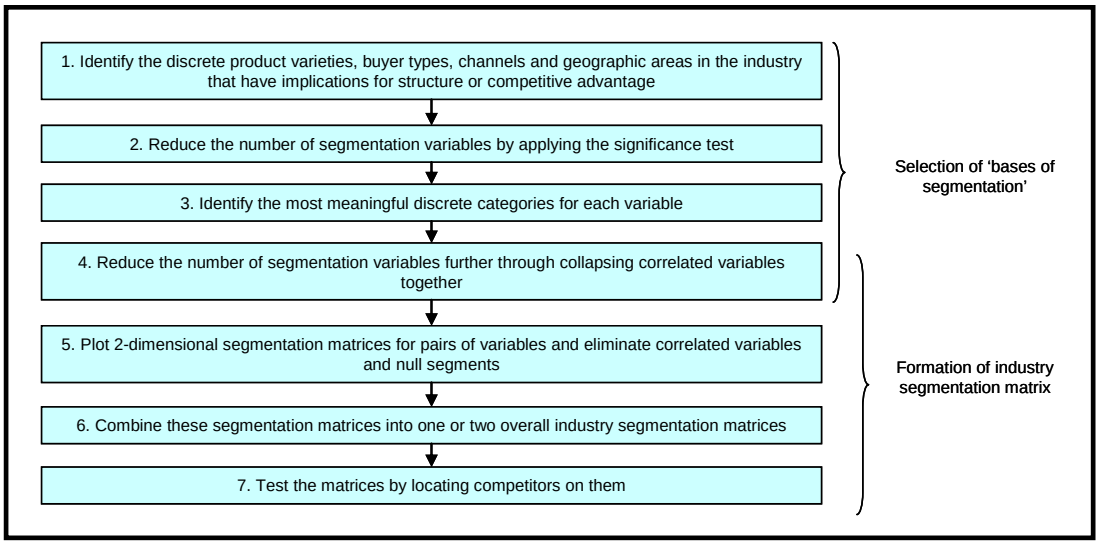


Figure 2-11: The industry segmentation process (Porter, 1985)

The difference with the Porter approach is that it does not seek to suggest in advance a ranking or prioritisation of segmentation criteria but seeks to guide the user to compile their own bespoke matrices. The limitation is that there are around 28 suggested bases that need to be evaluated.

2.3.3.4 Limitations of Industrial Market Segmentation

A familiar concern was expressed by Wind & Cardozo (1974/3) p155:

'Industrial marketers by no means use market segmentation strategies as widely or effectively as they might'

The 12 areas for further research in Wind's (1978) review of the issues and advances in segmentation research primarily focused on the segmentation process and its impact from a marketing perspective. Shapiro & Benson (1984) p105 believe that:

'*The problem is to identify the relevant segmentation bases'*

This is a view shared by Doyle (2002) p67 who states that:

'…Segmentation is an art rather than a science. The task is to find the variable or variables that split the market into actionable segments…' and *'…Market segments arise from managers' conceptualization of a structured and partitioned market, rather than the empirical partitioning of the market basis of collected data on consumer characteristics'*

In support of the view of Mahajan & Jain (1978), Johnson & Flodhammer p204 state:

'Segmentation may be more of a problem of resource allocation than of measuring, calculating and statistical analysis'

Plank (1985) p90 suggests the need for a:

'new conceptual model based firmly on user requirements with an expanded definition of the process and implementation of market segmentation'

It therefore seems a somewhat 'chicken and egg' situation. Which comes first: the right bases of segmentation around which an actionable process for implementation can be developed, or the right process for implementation that helps to identify actionable bases? Dibb & Wensley (2002) looked at the problems of integrating customer requirements into operations strategy. Their study reinforced the views of Plank (1985), Mahajan & Jain (1978) and Johnson & Flodhammer (1980) who reported that the development of segments was conducted independently of the allocation of resources to implement. It is therefore not surprising that the study concluded (p246):

'Segmentation analysis is not only poorly directed but actually of rather limited value…established marketing logic of segmentation is substantially flawed'

2.3.4 Summary

Customer responsiveness is an amalgam of philosophies and an emerging field of study. At the heart of customer responsiveness is the ability to align the DCDF processes. Market orientation captures the essence of the DC aspects and suggests that the starting point of customer responsiveness is market segmentation. This in itself is problematic

as market segmentation is still a somewhat theoretical concept, confined to the territory of market planning. Evidence of effective segmentation in practice is limited. Opinion is divided on whether this is due to problems identifying an appropriate means of segmentation or issues with the segmentation process itself.

Lean, agile and quick response are all strategies that can be used as part of the DF process. There is not an exclusive range of options and it can be damaging to label supply chain responses in such a way. The central tenet of customer responsiveness is the notion that supply chain strategy should evolve in response to market segments that deliver a discrete set of customer benefits. This philosophy is one that appears more readily accepted by business strategists than marketers but its adoption is crucial to the successful development of CRSC strategy.

2.4 Developing Customer Responsive Supply Chain Strategy

2.4.1 Introduction

The process of developing CRSC strategy moves beyond the concept of customer responsiveness. As customers become increasingly sophisticated and demanding, it is unlikely that markets can be represented by one segment and hence fulfilled by one supply chain strategy. As Shewchuk (1998) indicated in the title of his conference paper:

'One Size Does Not Fit All'

This view was reinforced by Christopher & Towill (2000a) who argue that (p114):

'The nature of the marketplace environment should drive the determination of supply chain strategy and structure'

Selen (2001) (p106) goes further still and believes that modern business management practices can be positioned within the

'Framework of demand chain and supply networks'

In essence Selen subscribes to the view that the DC mechanism (demand chain) and DF mechanism (supply network) define modern business management. Not only does this demonstrate the strategic importance of linking DCDF processes but once again the lack of consensual definition. The aim of this section is to take the debate beyond the philosophy of customer responsiveness and consider the strategic process by which the DCDF processes can be linked. There are two main objectives reflected in the structure for the section:

1. To explore the different concepts that have identified the differing perspectives of DC and DF and sought to provide a link
2. To review current approaches to the development of CRSC strategy

2.4.2 Linking the Processes of DCDF

This section begins with a review of the different perspectives of demand and supply that have been expressed over the years; secondly a review of the concept of demand chain management and its role in linking the DCDF processes; and finally, to appraise the different criteria that have been suggested as a mechanism by which demand can be balanced with supply.

2.4.2.1 Perspectives of Demand and Supply

Theodore Levitt (1960) in his seminal article 'Marketing Myopia' states (p55):

'The view that an industry is a customer-satisfying, not a goods producing process, is vital for all businessmen to understand'

This signifies that as early as 1960 the need for demand driven supply chains was recognised. Whilst Levitt contrasted these two processes, the reality is that the product producing process needs to link with the customer satisfying process to actually deliver customer satisfaction. Treacy & Wiersema (1993; 1995) believed that competitive advantage could be achieved either through operational excellence[25] (supply) or customer intimacy (demand). Whilst this may hold true in some markets, surely greater competitive advantage can be derived by harnessing the benefits of both operational excellence and customer intimacy[26]. In fact, empirical evidence has begun to show that operational excellence is a prerequisite to supply chain excellence (Berger and Gattorna, 2001) and is not the end result. The common theme that runs through this and the other perspectives listed in table 2-5 is the contrast between supply and demand perspectives. The supply-side is concerned with internal efficiency of the supply chain and the demand perspective focuses on effectiveness in terms of satisfying external customer demand.

As Hines (2002b) commented, (p708):

'[what's required] *is an integrative approach that seeks to gain a more holistic and contingent decision making process'*

In other words, an approach is needed that draws together what can appear to be the conflicting perspectives of demand and supply. Demand chain management is an emerging approach for doing this.

[25]Operational Excellence = 'Flawless execution' (Vollmann et al., 2000)
[26] Treacy & Wiersema did suggest a third strategy 'product innovation' the successful implementation of which would require co-ordination of both demand and supply

Source	Demand perspective	Supply perspective
Levitt (1960)	Customer satisfying process	Goods producing process
Treacy & Wiersema (1993)[27]	Customer Intimacy: Segmenting and targeting markets precisely and then tailoring offerings to match exactly the demands of those niches	Operational Excellence: providing customers with reliable products or services at competitive prices that are delivered with minimal difficulty or inconvenience
Morash, Dröge & Vickery (1996)	Demand-Orientated : stresses external customer, external customer interfaces, and external goals and objectives	Supply-Orientated : stresses the internal customers (e.g. marketing, production, retail outlets) and the distribution networks for market value and competitive advantage
Hoover, Eloranta, Homström & Huttunen (2001)	Retail perspective – the demand chain	Manufacturing perspective – the supply chain
Langabeer & Rose (2001)	Consumer demand – driven or demand chain : about effectiveness	Supply chain : about efficiency
Selen (2001)	Demand chain management	Supply network
Heikkila (2002)	Customer satisfaction	Supply chain efficiency
Frohlich & Westbrook (2002/11)	Demand integration	Supply integration
Landeghem & Vanmaele (2002/11)	Demand chain management: tries to obtain more reliable and detailed information about (prospective) consumers. It provides feedback on changing customer taste, evolving product life cycles, and the impact of promotions.	Supply chain management: integration of material and information flow from the market to supply chain partners
Rainbird (2004)	Demand chain management processes	Supply chain management processes
De Treville, Shapiro & Hameri (2004) p615	Demand integration : integration that supports market mediation with the primary role of demand integration being the transfer of demand information to facilitate greater responsiveness to changing customer needs	Supply integration : integration that supports the efficient manufacture and delivery of goods

Table 2-5: Key attributes of the demand and supply perspectives

2.4.2.2 Demand Chain Management

Brace & Gibbons (1989) first defined the concept of the demand chain when they observed that (p222):

'… the whole manufacturing and distribution process may be seen as a sequence of events with but one end in view: it exists to serve the ultimate consumer'

Since then the 'whole chain' (Frohlich and Westbrook, 2002/11; Hoover et al., 2001; Vollmann and Cordon, 1998; Vollmann et al., 1995; 2000; Williams et al., 2002/11; de Treville et al., 2004) and 'customer oriented' (Frohlich and Westbrook, 2002/11; Heikkila, 2002; Hoover et al., 2001; Vollmann et al., 2000; Walters and Rainbird, 2004; de Treville et al., 2004) aspects of their original definition have remained a common theme in other definitions as illustrated in table 2-6. These integrative views of demand chain management are suitably summarised by Hines, Silvi & Bartolini (2002b) who believe that DCM = integration of real demand or customer perspective into supply chain thinking. A contrasting view is that DCM = Demand Management = Demand Creation Process (Langabeer and Rose, 2001; Rainbird, 2004; Van Landeghem and Vanmaele, 2002/11; Walters and Rainbird, 2004).

[27] Product Innovation is the third strategy proposed by Treacy & Wiersema but this has no stated bias to either the demand or supply perspective

Source	Definition	Core concepts				
		Whole Chain	Customer Orientated	Demand Management	Virtual Enterprise	Electronic Commerce
Brace & Gibbons (1989) p222	'.. the whole manufacturing and distribution process may be seen as a sequence of events with but one end in view: it exists to serve the ultimate consumer'	✓	✓			
Vollmann, Codon & Raabe (1995)	Develop synergy along the whole supply and delivery chain, from your suppliers' suppliers, to your customers' customers in order to satisfy the demand of the end consumers.	✓				
Vollmann & Cordon (1998)	Demand chain **transformation** is to create synergy with the chain acting as a "virtual enterprise," achieving the benefits of vertical integration without the costs	✓			✓	
Vollmann & Cordon ((2000) p83	A set of practices aimed at managing and coordinating the whole demand chain, starting from the end customer and working backward to raw material suppliers.	✓	✓			
Heikkla (2002) pp761/2	Demand chain **architecture** means understanding the nature of demand and developing a modular demand chain structure – including decisions of the order-penetration point, inventory buffer locations and sizes, and assembly capacity.		✓			
Fohlich & Westbrook (2002/11) cite Vollmann *et al.* (2000) p729	DCM is defined as a practice that manages and coordinates the supply chain from end-customers backwards to suppliers	✓	✓			
Hoover, Eloranta, Homström & Huttunen (2001)	The demand chain is the chain of activities that communicates demand from markets to suppliers	✓	✓			
Langabeer & Rose (2001)	Demand chain management is a focus on creating demand strategy (what is optimal for each product-market?) and manages the entire organisation to meet this demand.			✓		
Landeghem & Vanmaele (2002/11)	Demand chain management tries to obtain more reliable and detailed information about (prospective) consumers. It provides feedback on changing customer taste, evolving product life cycles, and the impact of promotions.			✓		
De Treville, Shapiro & Hameri (2004) p617	A demand chain is a supply chain that emphasises market mediation to a greater degree than its role of ensuring efficient physical supply of the product.	✓	✓			
Williams, Maull & Ellis (2002/11)	"Demand chain management" (DCM): the management of supply production systems designed to promote higher customer satisfaction levels through electronic commerce (EC) that facilitates physical flow and information transfer, both forwards and backward between suppliers, manufacturers, and customers.	✓				✓
Walters & Rainbird (2004) p474	The demand chain then is: 'An understanding of current and future customer expectations, market characteristics, and of the available response alternatives to meet these through the deployment of operational processes'		✓	✓		

Table 2-6: Comparison of definitions of DCM and their underlying concepts

In fact the author believes that there are 4 conceptualisations of DCM as summarised in figure 2-12. Concept 1 represents the whole chain and customer orientated school led by Brace (1989). Concept 2 expresses the view led by Langabeer and Rose (2001) who see demand chain management as a separate process to supply chain management focusing on the management of demand. Concepts 3 and 4 are essentially the same though the terminology is different. They propose that DCM is the process of linking, integrating or aligning demand management with supply management (Godsell, 2005).

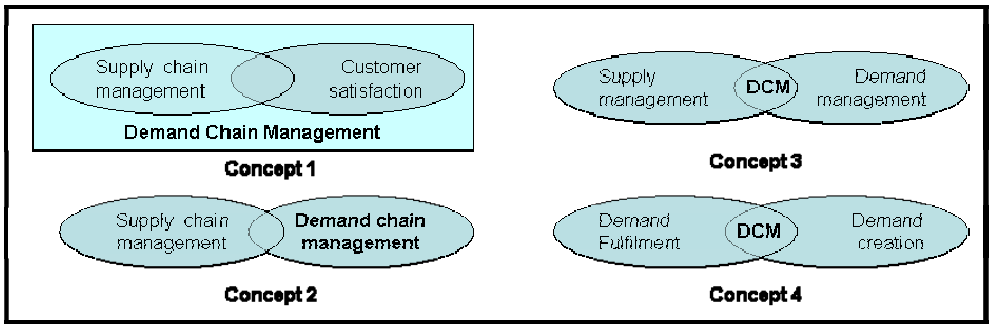


Figure 2-12: Conceptualisations of DCM

This is the view adopted by the demand chain community at Cranfield (cited in Ryals, Baker & Berger (2007) p5 who define demand chain management as:

'…the management of collaborative business relationships with both customers and suppliers through the integration of marketing (demand creation) and supply chain management (demand fulfilment), enabling these areas to be planned and managed jointly to deliver customer responsiveness and network-wide value'

Given the burgeoning issues of consensual definition, the adoption of demand chain management as a new term is problematic. Further reference to the term 'demand chain management' in this thesis has therefore been dropped. The term CRSC strategy as an approach for aligning the DCDF processes will continue to be used.

2.4.2.3 Criteria that Link the DCDF Processes

Oliver & Weber (1982) were two of the first academics to propose the critical evaluation of factors that have significant cross-functional implications and where trade-offs[28] need to be made. They implied that consideration of these factors could provide a link between the DCDF processes as illustrated in table 2-7.

Key strategic elements with significant cross-functional implications	Functional Strategy		
	Marketing strategy (Demand Creation)	Manufacturing strategy (Demand Fulfilment)	Product strategy (Demand Creation)
Demand	✓		✓
Lead time	✓	✓	
Reliability	✓		
Responsiveness	✓		
Flexibility		✓	
Minimum run size		✓	
Changeover		✓	
Variety			✓
Range			✓

Table 2-7: Summarising key strategic elements with significant cross-functional implications and links to functional strategy (after Oliver & Weber (1982))

The first explicit link between DCDF processes was made by Hill (1985) with the introduction of the concept of order winners/order qualifiers (OW/OQ) to provide a link between corporate/marketing and manufacturing strategy. OQ are the factors that are required to compete in a market (the threshold criteria) and OW are the factors that win orders. Hill made a distinction between criteria that could be influenced by

[28] Between marketing, manufacturing and product strategy

manufacturing (price, quality, delivery speed and delivery reliability) and those that were the responsibility of other parts of the business (colour range, product range and design leadership). Hill proposed that once suitable market segments had been identified, they could be described in terms of OW/OQ and the relevant ones used to drive manufacturing strategy. The concept of OW/OQ, as the link between market segments and manufacturing strategy, has been widely adopted. For example, Ward (1996) cites cost, quality, delivery performance (time) and flexibility as the dimensions upon which 'competitive manufacturing capabilities' are developed. The dimensions have also been articulated in terms of customer value criteria (Johansson et al., 1993) – quality, cost, service and cycle time – in a business process reengineering context. A natural extension for the concept of OQ/OW was to supply chain strategy (Christopher and Towill, 2000a and b; Mason-Jones et al., 2000). Christopher & Towill (2001) believed that (p237):

'We can borrow from these important ideas to develop a wider supply chain oriented concept of "market qualifiers" (MQ) and "market winners" (MW). The notion here is that to be truly competitive requires not just the appropriate manufacturing strategy, but rather an appropriate holistic supply chain strategy…'

It does not require the coining of a new term to show the application of an enduring principle to a broader supply chain context. They are in essence the same thing and OW/OQ will be used in this thesis unless direct referencing otherwise dictates. The extension of the OW/OQ concept to the supply chain arena has evolved in part as a mechanism for positioning and reconciling the lean and agile paradigms. The juxtaposition of lean and agile supply chain strategies was formalised by Naylor, Naim & Berry (1999). Mason-Jones, Naylor & Towill (2000) further developed this concept by associating different MW/MQ to commodities (requiring a lean strategy) and fashion goods (requiring an agile strategy) as illustrated in figure 2-13.

Figure 2-13: Classification matrix based on market winners and market qualifiers (Mason-Jones et al., 2000)

This classification gained broad acceptance in the lean-agile community and was a commonly cited (Christopher and Towill, 2001) and developed (Aitken et al., 2005) model. It signified the start of the lean-agile 'school'[29] of segmented supply chain strategy.

[29] School is used in this context to represent an informal body of conversants who are developing supply chain strategy based on the same underlying principles

School 1: Lean-Agile

The lean-agile school's approach to supply chain strategy is **product** driven. It echoes the views of Fisher (1997) and suggests that different supply chain strategies are required for different product types but goes further by assigning different OW/OQ criteria to each of these product/supply chain strategy combinations (Mason-Jones and Towill, 1999; Aitken et al., 2005; Childerhouse et al., 2002/11; Christopher and Towill, 2001) as illustrated in figure 2-14.

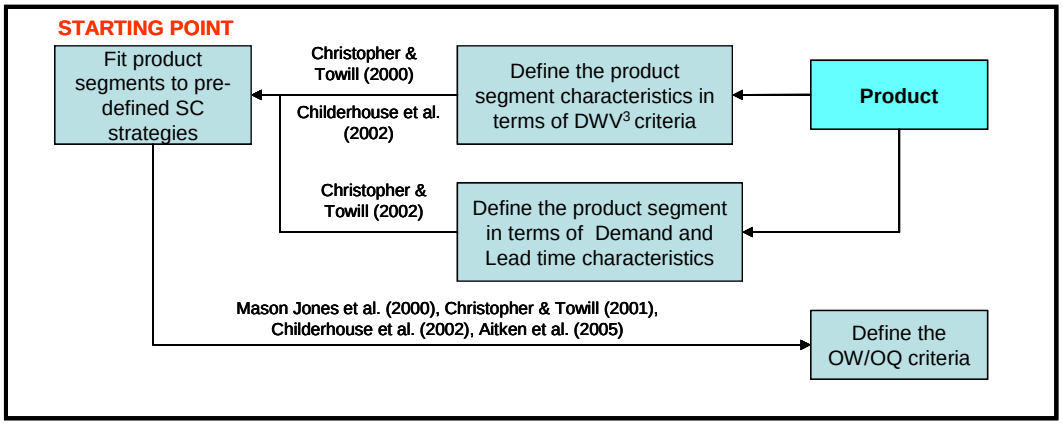


Figure 2-14: Summary of the links between product segmentation, supply chain strategy and OW/OQ as depicted by lean-agile school

To quote Christopher & Towill (2001) p237:

'The connection between these ideas of "qualifiers" and "winners" and "lean" and "agile" is critical. At its simplest the lean paradigm is most powerful when the winning criterion is cost; however, when service and customer value are prime requirements for market winning then the likelihood is that agility will become the critical dimension'

The next significant development within this school was the introduction of the DWV^3 market characteristic criteria by Christopher & Towill (2000a). The five criteria (**D**uration of lifecycle, Time **W**indow for delivery, **V**olume, **V**ariety and **V**ariability) could be applied to different products and used to drive supply chain strategy. This approach was retrospectively applied to the Global Lighting case study by Childerhouse, Aitken & Towill (2002/11). Essentially the case:

1) Developed product clusters based on the DWV^3 variables
2) Developed supply chain strategies for each of these product clusters
3) Linked the supply chain strategy to an OW e.g. cost or availability, then based on this added a 'lean' or 'agile' categorisation

A further contribution of this paper was to make the link between supply chain strategy and product life cycle (PLC) management suggesting that supply chain strategy varies depending on its stage in the PLC.

Christopher & Towill (2002) p9 also developed:

'…a simple three dimensional classification appropriate for global supply. The variables and their binary gradation are:

- *Products (**either** standard **or** special)*
- *Demand (**either** stable **or** volatile)*
- *Lead Times (**either** short **or** long)'*

Combined, these factors form eight alternative pipelines. Pipelines are linked to a 'specific market winner criteria' but in a fairly superficial way that links cost to efficiency and a lean strategy (but only where demand is stable), and availability to agility.

Pursuing the pipeline theme Aitken, Childerhouse, Christopher & Towill (2005) developed a set of seven generic 'delivery pipeline strategies' as illustrated in figure 2-15. The pipelines were developed by combining Lampel & Mintzberg's (1996) 'continuum of strategies', Pagh and Cooper's (1998) postponement and speculation strategies and Schewchuk's (1998) 'one size does not fit all' approach. The framework is largely theoretical[30] and does not explicitly link the OW/OQ criteria and the emergent pipeline strategies. Aiken et al. (2005) p74 believe that:

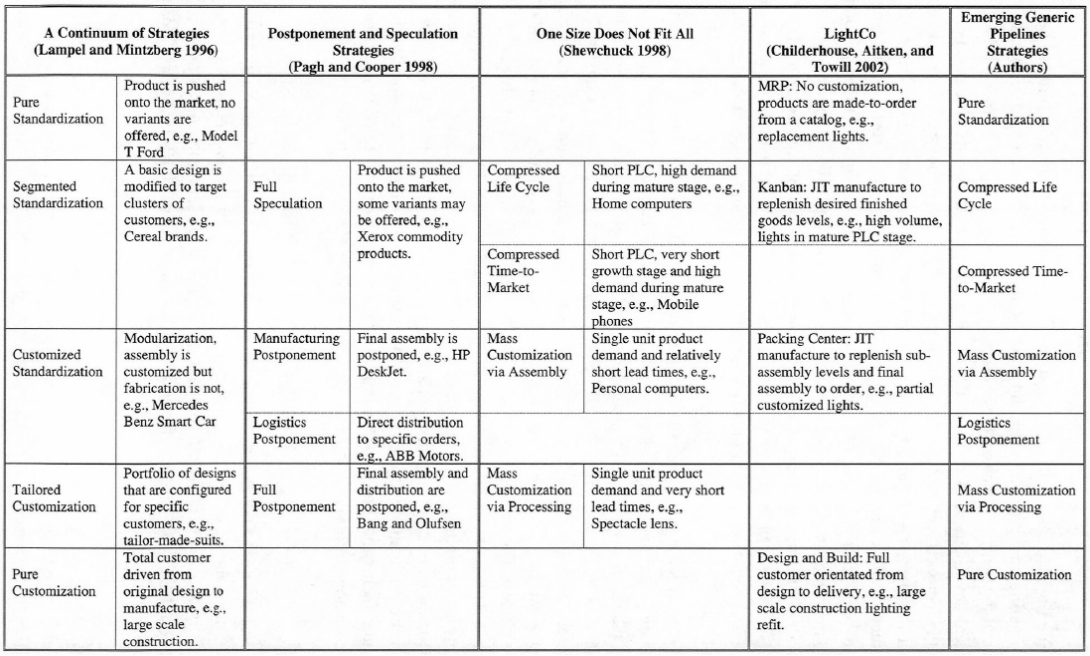
'identifying this generic family of delivery pipelines greatly eases technology transfer and the establishment of "best practice" because it becomes much clearer how pipeline performance may be measured and compared in a meaningful way'

In reality, supply chains are context-specific and therefore generic pipelines may not be appropriate – particularly when they seek to establish and transfer 'best practice'. To quote Lapide (2006) p20:

'best practices only work under certain business conditions in certain industries'

The limitations of the 'delivery pipeline strategies' approach are common across the lean-agile school. Firstly, the approach is product centric, something that Levitt (1960) would find hard to comprehend. Secondly, it is also largely theoretical with case studies being retrospectively fitted to the frameworks as illustrated in table 2-8. Thirdly, it is a normative approach that seeks to develop 'ideal types' against which products can be 'force fitted' and as we know from the work of the sociologist Weber (1864-1920) these are useful abstractions for comparison but do not exist in practice.

[30] The product segments from the Global Lighting case study (Childerhouse et al., 2002/11) were retrospectively applied to the framework but it has had no formal empirical testing



A Continuum of Strategies (Lampel and Mintzberg 1996)		Postponement and Speculation Strategies (Pagh and Cooper 1998)		One Size Does Not Fit All (Shewchuck 1998)		LightCo (Childerhouse, Aitken, and Towill 2002)	Emerging Generic Pipelines Strategies (Authors)
Pure Standardization	Product is pushed onto the market, no variants are offered, e.g., Model T Ford					MRP: No customization, products are made-to-order from a catalog, e.g., replacement lights.	Pure Standardization
Segmented Standardization	A basic design is modified to target clusters of customers, e.g., Cereal brands.	Full Speculation	Product is pushed onto the market, some variants may be offered, e.g., Xerox commodity products.	Compressed Life Cycle	Short PLC, high demand during mature stage, e.g., Home computers	Kanban: JIT manufacture to replenish desired finished goods levels, e.g., high volume, lights in mature PLC stage.	Compressed Life Cycle
				Compressed Time-to-Market	Short PLC, very short growth stage and high demand during mature stage, e.g., Mobile phones		Compressed Time-to-Market
Customized Standardization	Modularization, assembly is customized but fabrication is not, e.g., Mercedes Benz Smart Car	Manufacturing Postponement	Final assembly is postponed, e.g., HP DeskJet.	Mass Customization via Assembly	Single unit product demand and relatively short lead times, e.g., Personal computers.	Packing Center: JIT manufacture to replenish sub-assembly levels and final assembly to order, e.g., partial customized lights.	Mass Customization via Assembly
		Logistics Postponement	Direct distribution to specific orders, e.g., ABB Motors.				Logistics Postponement
Tailored Customization	Portfolio of designs that are configured for specific customers, e.g., tailor-made-suits.	Full Postponement	Final assembly and distribution are postponed, e.g., Bang and Olufsen	Mass Customization via Processing	Single unit product demand and very short lead times, e.g., Spectacle lens.		Mass Customization via Processing
Pure Customization	Total customer driven from original design to manufacture, e.g., large scale construction.					Design and Build: Full customer orientated from design to delivery, e.g., large scale construction lighting refit.	Pure Customization

Figure 2-15: A categorization of pipeline strategies (Aitken et al., 2005)

Contributor	Specific Contribution	Paper type	Source
School 1: Lean - Agile			
Mason Jones, Naylor & Towill (2000)	Links MW /MQ to different product types (fashion vs. commodity)	Largely theory building with the retrospective application to 3 public domain cases	Journal paper
Christopher & Towill (2000)	DWV^3 market characteristics criteria to drive supply chain strategy	Largely theory building with the retrospective application to Obermeyer Sport	Conference paper
Christopher & Towill (2001)	Reinforces position of Mason Jones et al. (2000)	Theory building supported by examples from high profile public domain cases	Journal paper
Christopher & Towill (2002)	Introduces a 3D global SC pipeline selection taxonomy based on product (standard or special), demand (stable or volatile) and lead time (short or long)	Largely theory building with the retrospective application to Griffin Manufacturing Co	Journal paper
Childerhouse, Aitken & Towill (2002)	Supported the use of DWV^3 to categorise demand chain types and concept of linking different OW/OQ to different stages of the product lifecycle	Theory is retrospectively fitted to Global Lighting case study.	Journal paper
Aitken, Childerhouse, Christopher & Towill (2005)	A categorisation of 7 generic pipeline strategies. OW/OQ / pipeline not cited though it is inferred there is a relationship	Theory is retrospectively fitted to Global Lighting case study	Journal paper
School 2: Strategic Alignment			
Gattorna & Walters (1996)	Introduces concept of strategic alignment linking the competitive environment to strategy, culture and leadership style. Normative based on a series of inter-related 2x2 matrices	Theory building supported by examples from high profile public domain cases	Book
Gattorna (1998)	More explicitly makes the link between customer segmentation based on buying behaviour and resultant SC strategies	Largely theory building but approach applied to Fonterra	Book
Christopher & Gattorna (2005)	Shift to dynamic alignment. More prescriptive in terms of SC responses. Now fully named: Fully flexible, lean, agile and continuous replenishment	Largely theory building but some examples from consultancy engagements and high profile public domain cases	Journal paper
Walters (2006)	Loosely coupled links between a wide range of customer value drivers and the impact on different SC response issues depending on stage in value chain	Largely theory building with the retrospective application to Zara and Cheviot Bridge	Journal paper

Table 2-8: Comparison of the contribution between the two main schools of thought in linking OW/OQ criteria to supply chain strategy

School 2: Strategic Alignment

In parallel to the development of the lean-agile school, the strategic alignment school also sought to formalise the link between DCDF. As its name suggests it took a more strategic approach. Gattorna & Walters (1996) introduced a four-stage framework for strategic alignment, proposing that strategy is developed in response to the competitive environment, supported by the right culture and leadership style. Based on Carl Jung's theory (that behaviour is not random but demonstrates a pattern of consistency) they defined four logics (**P**roduction, **A**dministration, **D**evelopment and **I**ntegration). These are the basis of 'consistency of behaviour' throughout the framework. The logics have a number of common themes (as illustrated in table 2-9). In order for strategic alignment to be achieved there needs to be a fit between the 'logics' at each stage of the four stages in the framework, thus creating a 'hierarchy of logics'. In its earliest form the framework was used to develop customer service strategy developed around a series of customer service elements including: frequency of delivery, order cycle time, reliability of delivery, flexibility in replenishment, order fulfilment accuracy, accuracy of documentation, conformance of documentation, continuity of supply (reliability), advice on supply problems and quality of technical support.

Logic		Means	Output	Characteristics
P	Production	Action	Results	Objectives, goal orientation, drive, persistence
A	Administration	Control	Order	Systems, measurement, stability
D	Development	Create	Change	Innovation, creativity, discontinuity
I	Integration	Integrate	Cohesion	Synergy, teamwork, co-operation

Table 2-9: Logics and common themes (Gattorna and Walters, 1996)

In the service context Gattorna and Walters avoid the terms OW/OQ but use the equivalent terms of qualifying services and determining services. Figure 2-16 illustrates how the strategic alignment model can be applied to develop customer service strategy.

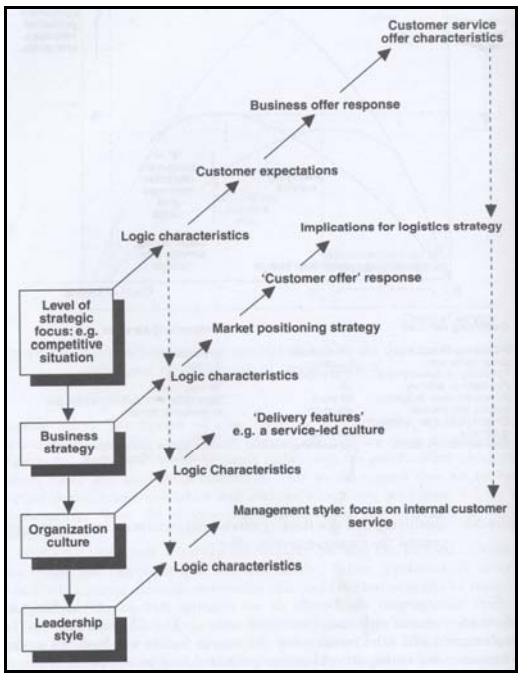


Figure 2-16: Logics leading to the alignment of the strategic components and customer service strategy (Gattorna and Walters, 1996)

As illustrated in figure 2-17, it is important to note that this approach begins with the **customer** and not the product. Customers are segmented based on their service expectations. The 'logic' for each customer segment is understood and a 'customer offer' response (the demand fulfilment processes) developed based on the same logic. Gattorna (1998) further developed this concept in a supply chain context.

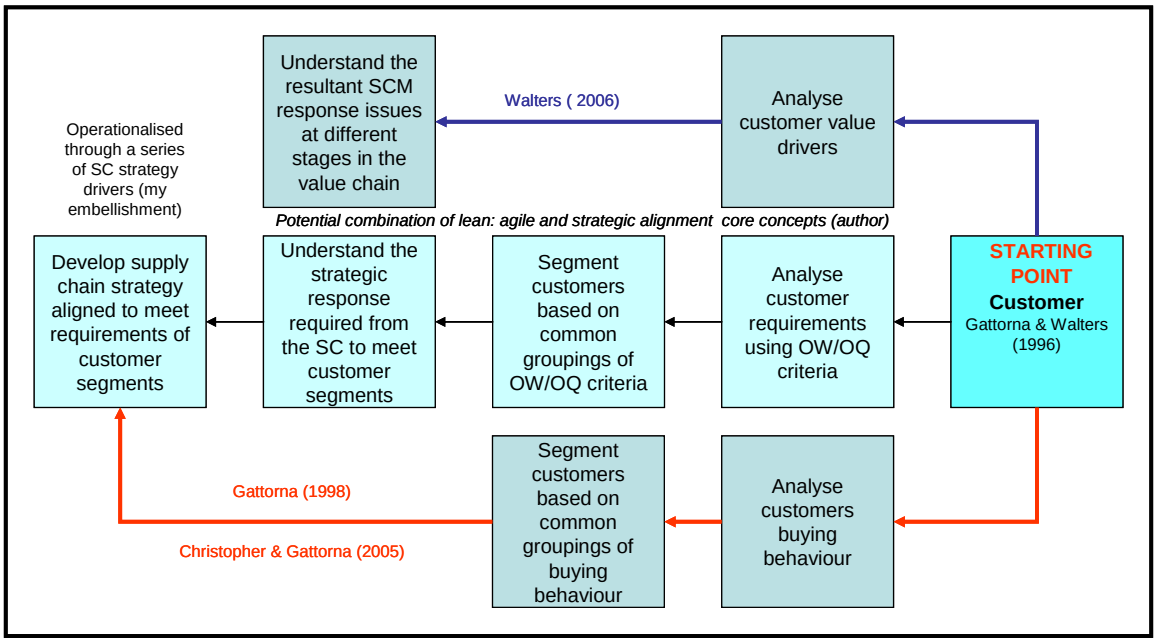


Figure 2-17: Summary of the links between customer value and supply chain strategy from the Strategic Alignment community

Gattorna (1998) believed that customers can be segmented based on their buying behaviours and supply chain strategy can then be developed to meet the requirements of the individual segments. Over time his work has become progressively more normative and, as illustrated in figure 2-18, he now has clearly defined customer segment types and corresponding supply chain types. Once again we are in the territory of generic types driven in this case by 'dominant buying behaviours'. It does not link to the concept of OW/OQs and makes it difficult to see how the supply chain type would be operationalised. The strategic alignment model is again largely theoretical and whilst it has been applied through consulting assignments to a handful of companies (e.g Fonterra) it lacks substantive empirical evidence.[31]

As time has progressed, unlike his 1996 co-author Gattorna (1998), Walters (2006a; 2006b) has migrated from the strategic alignment framework to a less prescriptive approach for aligning DCDF processes. He has developed a series of customer value drivers across six areas (namely the management of assets, performance, cost, time, information and risk) which are configured to represent the demand chain profile for a given customer set. By considering the appropriate supply chain response issues at the appropriate stage in the value chain, a customer value driven supply chain response is developed. This approach is illustrated in figure 2-18.

[31] The contribution and empirical evidence base for all contributions to both the lean-agile and strategic alignment schools is summarised in table 2-8.

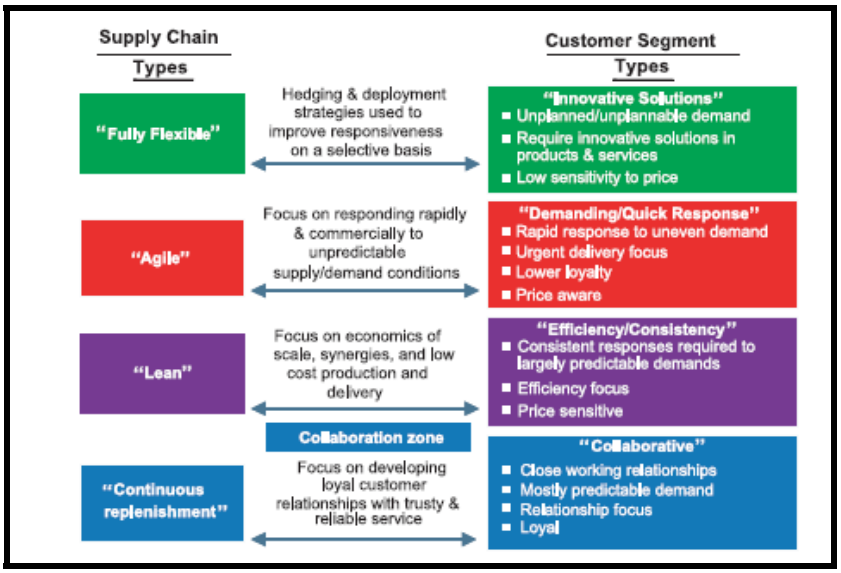


Figure 2-18: Different 'value propositions' and strategies require different supply chain solutions (Christopher and Gattorna, 2005)

Lapide (2006) states that supply chain excellence requires a context-specific approach based on a strategic framework and set of underlying principles, and not a set of generic answers. The Walters framework adheres to these principles but once again is largely theoretical having only been applied retrospectively to public domain cases such as Zara and Cheviot Bridge. As with the strategic alignment model it does not link to the concept of OW/OQs and makes it difficult to see how a supply chain response is operationalised. As proposed in figure 2-17 the use of OW/OQs to help define customer value would help to make the formation of behavioural customer segments more explicit. This in turn translates into operational factors that drive supply chain strategy. These applications are separate and distinct from the original OW/OQ concept though literature to date has not made this difference clear. The author has introduced the term 'supply chain strategy drivers' to support this important distinction. Hence there are two sets of criteria that seek to help align the DCDF processes, OW/OQ and supply chain strategy drivers, as illustrated in figure 2-17.

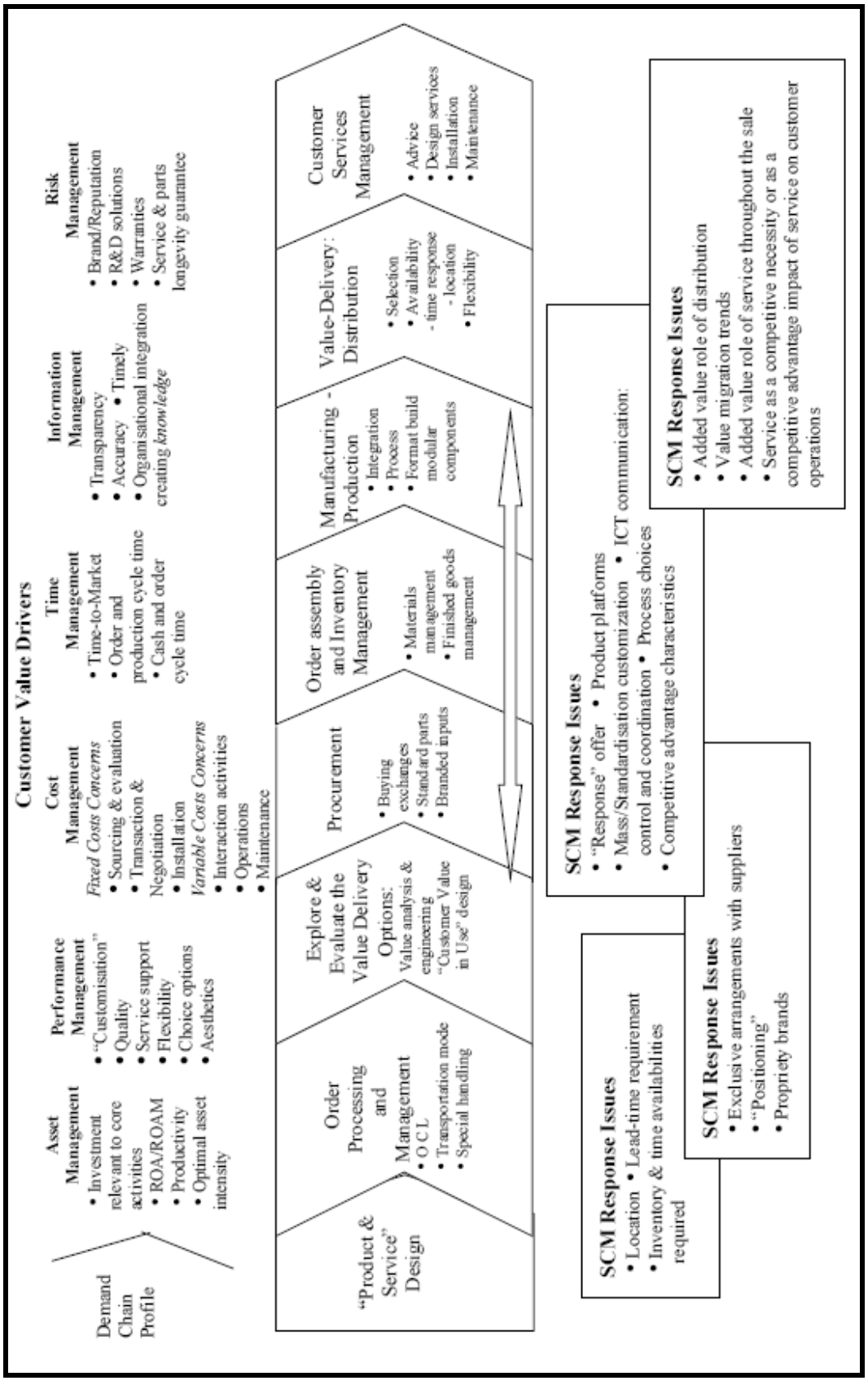


Figure 2-19: Using demand chain analysis to focus the supply chain (Walters, 2006a; Walters, 2006b)

2.4.3 Approaches to SC Strategy Formulation

With a more detailed understanding of the types of mechanisms that can be used to align the DCDF processes it is time to consider how these fit into broader frameworks of SC strategy formulation; the 'how' rather than the 'what'.

As mentioned in section 1.2.2.1, the link between manufacturing and corporate strategy was first made by Skinner (1969). This was a popular perspective for the development of manufacturing strategy over the next 20 years. Leong et al. (1990) distilled the views of the major contributors to this evolution in their predominant process model (PPM) of manufacturing. The first equivalent framework in a broader supply chain context is the strategic alignment (SA) model (Christopher and Gattorna, 2005; Gattorna and Walters, 1996; Gattorna, 1998). As illustrated in figure 2-20, both models start with an understanding of the competitive environment which in turn informs the strategy formulation process. This is then underpinned by the appropriate human factors or capabilities for implementation.

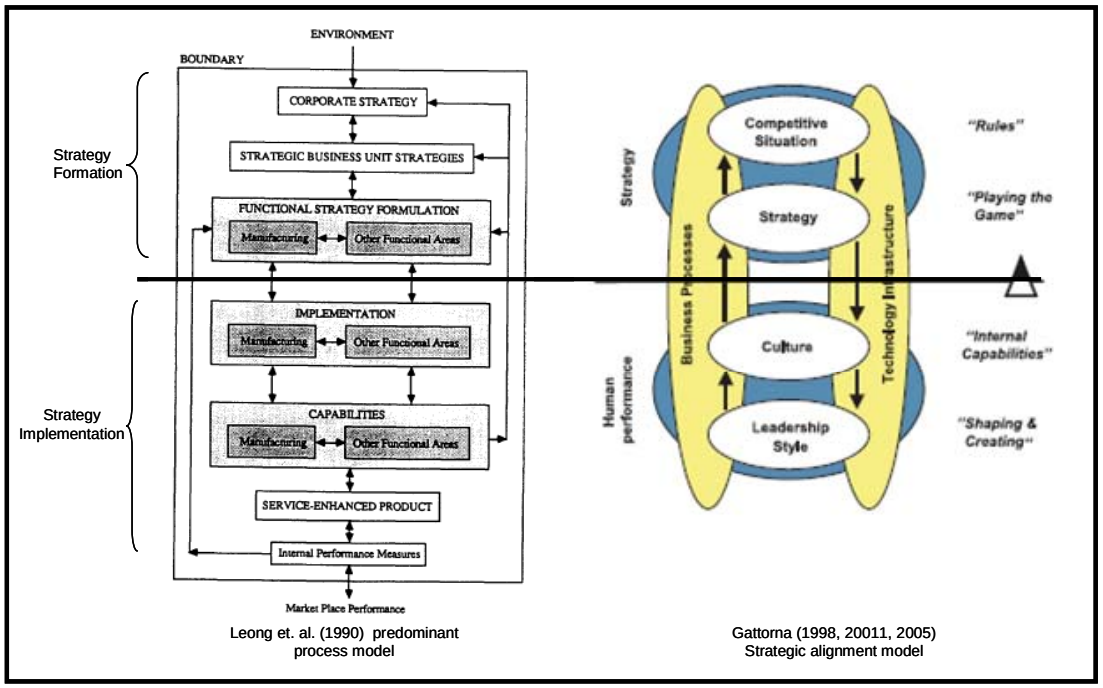


Figure 2-20: The contrast between the predominant process (Leong et al., 1990) and strategic alignment (Christopher and Gattorna, 2005; Gattorna, 1998) models

As mentioned in section 2.4.2.3, a strength of the strategic alignment model is that it is customer driven and seeks to develop segment specific supply chain strategies. This is in contrast to the Childerhouse et al.'s (2002/11) framework for the development of focused demand chains which starts with the product/service, as illustrated in figure 2-21.

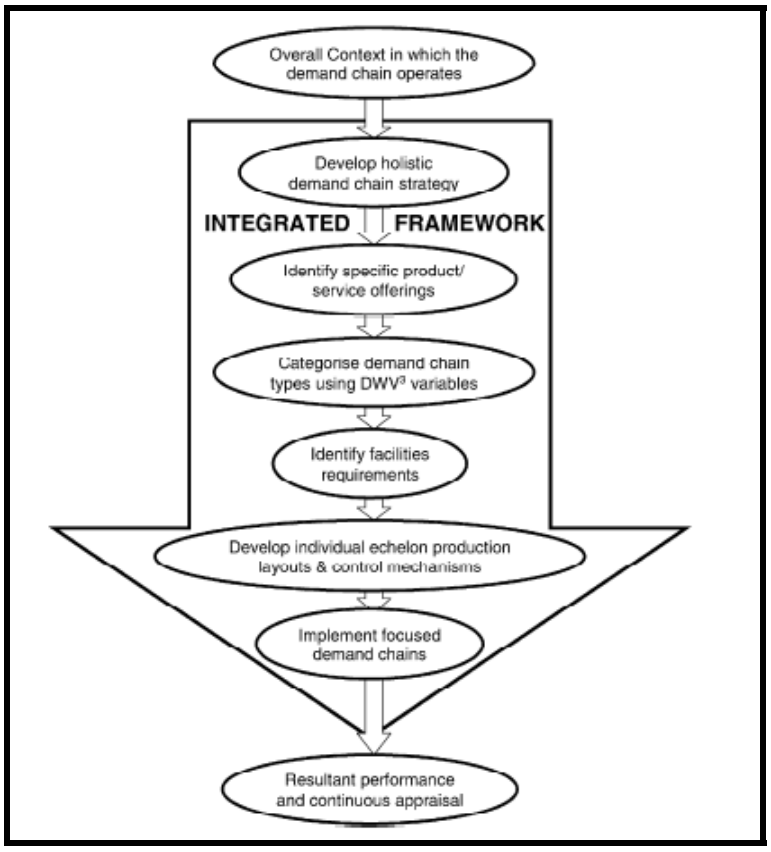


Figure 2-21: Integrated framework for the development of focused demand chains (Childerhouse et al., 2002/11)

The lack of customer focus is also a limitation of Lapide's (2006) framework for supply chain excellence as illustrated in figure 2-22. At the heart of the framework is a supply chain operating model that aligns with business strategy. This strategy is underpinned by a set of performance objectives which trade off measures of customer response, efficiency and asset utilisation. This is a product/service driven model that results in a 'one-size fits all' supply chain operating model and it is surprising that this is considered to be the key to SC Excellence by 2020.

Figure 2-22: Framework for an excellent supply chain (Lapide, 2006)

A further limitation of the above frameworks is their limited scope. They all focus on the alignment between a focal firm and its customers but do not address supplier alignment.

Campbell & Du Preez (2003) and Gattorna (2006) extend this conceptualisation of alignment to include 'reverse' or the 'supply-side' alignment which is considered to be a 'mirror-image' of the customer side and focuses on extending alignment to suppliers. Essentially the focal firm becomes the pivot between customer and supplier segmentation. This view of alignment is supported by Erevelles and Stevenson (2006) p484 who coin the term 'supply-side partitioning' which is defined as:

'The state of supply heterogeneity, where the total supply pool can be disaggregated into groups that may satisfy distinct demand functions in the marketplace'.

Erevelles & Stevenson (2006) developed a five step approach to align supply and demand optimally in a marketplace as orchestrated by the focal firm. The steps are:

1. Analyse demand and supply chain heterogeneity in the marketplace at various levels in the supply chain
2. Evaluate external opportunities presented on both the demand and supply sides of the marketplace with its own internal capabilities to select potentially relevant demand segments and supplier groups
3. Evaluate individual supply groups and demand segments that may potentially form trans-intermediary alignments called 'transvectional alignments'
4. Use the information about transvectional alignments to design a programme that optimally aligns one or more supplier groups with one or more demand segments, within the boundaries of its internal capabilities, to satisfy specific needs in the marketplace. This is referred to 'transvectional alignment strategy'
5. Constantly monitor the environment, and accordingly respond to it by modifying its supply chain strategy to satisfy its customers

This is essentially a theoretical approach and is illustrated using public domain 'high-tech' case examples. Its scope initially seems broad including both the customers and suppliers of the focal firm but it fails to achieve end to end alignment as it does not include the internal processes of the focal firm.

Whilst each of the aforementioned frameworks have their relative strengths and weaknesses, as summarised in table 2-10, none fully meets the criteria for a theoretical framework for the purposes of this thesis. The SA model appears to be the most comprehensive but it lacks sufficient scope as its primary focus is on upstream relationships with customers. It could be coupled with the concept of reverse alignment but this is highly theoretical and effectively turns the focal firm into a 'pivot point'. It fails to articulate how to connect the internal supply chain core processes (Plan, Source, Make and Deliver) with the external supply chain. This is not surprising given its limitations in terms of clearly distinguishing between the OW/OQ required to define customer segments and the supply chain strategy drivers required to operationalise SC strategy, as previously discussed in section 2.4.2.3.

Framework	Author	Strengths				Weaknesses	
		Consider competitive environment	Align with business strategy	Includes consideration of 'human factors'	Customer-led	Product-led	Scope
Strategic alignment model	Gattorna (1998, 2001, 1995)	✓	✓	✓	✓		✓ Focal firm – customer
Focused demand chains	Childerhouse et al. (2002)	✓	✓			✓	✓ Focal firm – customer
SC Excellence	Lapide (2006)	✓	✓			✓	✓ As determined by operating model
Reverse alignment	Campbell (2003), Gattorna et al. (2006)	✓	✓		✓		✓ Customer – supplier but focal firm is just pivot
Supply side partitioning	Erevelles (2006)				✓		✓ Customer – supplier but focal firm is just pivot

Figure 2-23: Summary of the strengths and weaknesses of different frameworks for developing SC strategy

A common attribute of all of these models is that they start with an understanding of the external environment. They subscribe to the 'structure-conduct-performance' paradigm of Industrial Organisation (IO) economics (Caves, 1980; Porter,1980). As illustrated in figure 2-24, IO argues that sustained competitive advantage is gained from pursuing a 'fit strategy' whereby strategy is developed in response to a market opportunity identified by studying the external environment and identifying an attractive industry.

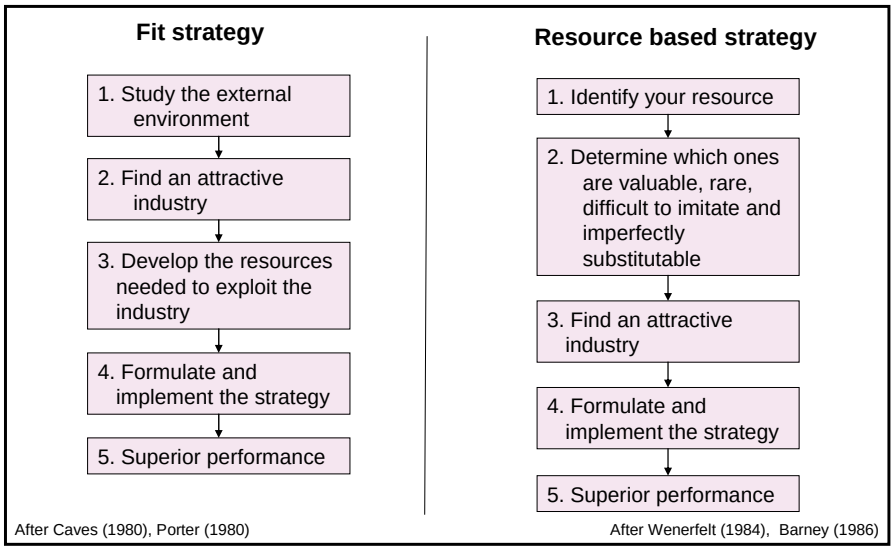


Figure 2-24: Two alternative approaches for achieving sustained competitive advantage

A contrasting and increasingly popular perspective for studies in a supply chain context is resource based strategy or resource based view (RBV)[32]. To quote Ambrosini (2007) p265:

'The resource-based view is concerned with the relationship between a firm's resources and competitive advantage.'

As shown in figure 2-24, the RBV is based on the premise that sustained competitive advantage is not derived from an understanding of market and industry structures but from a firm's internal resources. It is underpinned by the seminal work of Selznick (1957) on 'distinctive competencies' and by Penrose (1959) on the 'firm as a collection of resources' whose performance is dependent on its ability to use them. Wernerfelt (1984) was the first to formally coin the term resource-based view of the firm, where a resource (p172) was defined as:

'…anything which could be thought of as a strength or weakness of a given firm.'

Barney (1986; 1991; 1994) took this concept further and developed the concept of VRIN resources that are Valuable, Rare, Imperfectly Imitable and Not-substitutable. Full definitions of these terms are given in table 2-10.

Resource	Definition
Valuable	It exploits opportunities and/or neutralises threats
Rare	They must not be possessed by a large number of firms
Imperfectly imitable	Other firms cannot copy them and obtain the resources
Non-substitutable	There are no strategically equivalent substitutes for the resource

Table 2-10: Definitions of VRIN resources (after Barney (1991))

VRIN resources (Barney, 1991) can be in the form of:

- Physical resources – e.g. machinery, buildings
- Human resources – e.g. knowledge, experience, workers insight
- Organisational resources – e.g. culture, organisational structure. informal processes
- Financial resources – e.g. debt, equity

A further distinction made by Barney (1991) is the juxtaposition between the RBV which concentrates on the internal analysis of the firm (its strengths and weaknesses) and IO or 'fit strategy' which focuses on the external analysis of the environment in which the firm operates (its opportunities and threats). Refer to figure 2-25. These elements combine to form the SWOT[33] analysis a mainstay tool in strategic analysis.

[32] There has recently been a trend in the Journal of Operations Management to print studies based in a supply chain context using RBV as a theoretical underpinning. Examples include Barratt and Oke (2007) and Holweg and Pil (2008).

[33] Strengths, Weaknesses, Opportunities and Threats

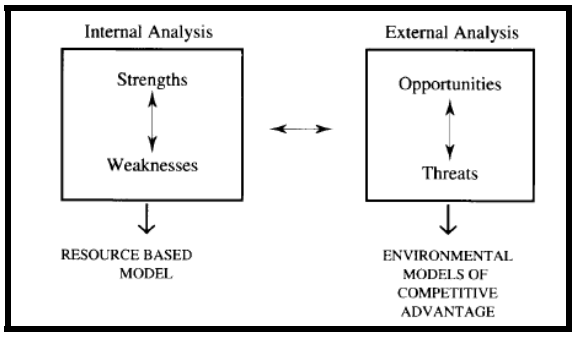


Figure 2-25: To illustrate the juxtaposition between internal and external analysis (Barney (1991))

This suggest that it does not need to be an either/or strategy (Ambrosini, 2007). For sustained competitive advantage to be achieved a balance of both approaches is required. This is a view supported by both the predominant process model of Leong et al. (1990) and Gattorna's (1998) strategic alignment model who as illustrated in figure 2-20 have strategy formulation processes that start with an understanding of the external environment but are then supported by the appropriate internal capabilities. In terms of developing a theoretical framework for CRSC strategy it suggests that given the customer orientation inherent in the approach it must start with an understanding of the external environment and market context in which the supply chain operates. Successful implementation of the strategy however, rests in the supply chain having the right capabilities (some of which may be VRIN) to enable success.

2.4.4 Summary

Whilst CRSC strategy seeks to move beyond the philosophical concept of customer responsiveness it suffers from many of the same issues. There is no literature that directly considers approaches to CRSC strategy formulation, which needs to be extracted from existing bodies of literature that seek to align the processes of DCDF. Whilst it is recognised that the alignment of demand and supply is critical to satisfying customers and shareholders alike, there is little consensual definition. Attempts to introduce the term DCM as an umbrella concept have been thwarted as this too suffers from a range of somewhat conflicting conceptualisations, ranging from management of demand to end-to-end management of demand and supply.

At a more operational level both the lean-agile and strategic alignment schools have tried to find mechanisms for aligning DCDF processes. Whilst the SA school does start with the customer, the lean-agile school still segments, based on product/service type – the antithesis of CRSC thinking. To date the approaches have been normative and largely theoretical and do not make the links between segmentation and SC strategy explicit and actionable. It is therefore proposed that there are two sets of criteria that seek to align DCDF processes: OW/OQ (to help define customer value and hence segmentation) and supply chain strategy drivers (as a mechanism for defining supply chain strategy).

Processes for implementing CRSC strategy largely support the IO or fit strategy perspective espoused by Caves (1980) and Porter (1980). This intuitively makes sense

for a strategy that is inherently customer driven and emanates from beyond the bounds of the firm. Successful implementation of a CRSC strategy is likely to depend on the organisation having the right capabilities to enable the strategy. If these capabilities meet the VRIN criteria then the RBV perspective would argue that sustained competitive advantage could be achieved.

2.5 Developing a theoretical framework for CRSC strategy

Whilst the literature did not reveal the 'ideal' framework for developing CRSC strategy, seven core principles did emerge.

1. CRSC strategy is 'context-specific' i.e. the external and internal environment of the focal firm is unique and needs to be considered as such
2. Given its context specificity, CRSC strategy begins with an understanding of the competitive environment
3. CRSC strategy is aligned to the business unit and corporate strategy
4. CRSC strategy is developed based on a strategic framework and set of guiding principles and not a set of generic frameworks and prescriptive solutions
5. It develops from a customer (not a product) centric approach
6. It begins by segmenting the customer base in a way that is relevant to supply chain strategy. OW/OQ can be used to describe the different customer segments.
7. Supply chain strategy is then developed to meet the requirements of individual customer segments. Supply chain strategy drivers could be used to define the key operational variables.

Whilst not necessary for developing CRSC strategy, successful implementation is dependent on the supply chain developing the right resources (possibly VRIN resources) to support the strategy. These principles are summarised figure 2-26, the emerging theoretical framework for this thesis.

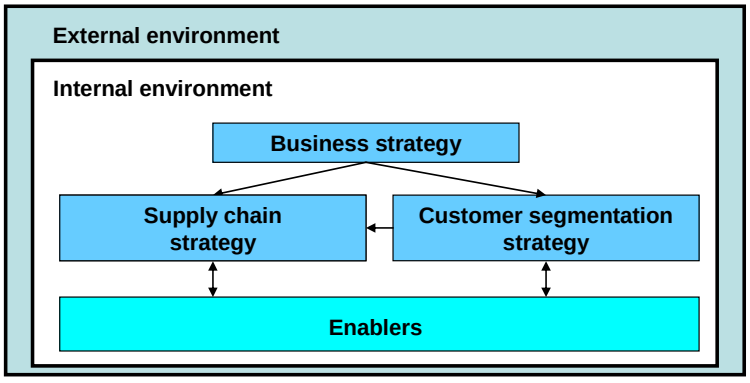


Figure 2-26: Emerging theoretical framework

2.6 Chapter Summary: Implications for this thesis

This chapter has sought to review the literature that underpins the emerging concept of CRSC strategy in order for the author to understand the contribution and limitations of current research in this area. This has led to the development of a theoretical framework to guide the studies. In addition three further themes emerge from the review: limited consensual definition; limited empirical evidence and scope. Each is now discussed in turn.

2.6.1 Limited consensual definition

This whole field of study is relatively immature, and as a result is prone to a lack of consensual definition. The net impact is that there are many alternative definitions for even the most basic of building blocks e.g. supply chain, supply chain management and segmentation. It also means that a number of alternative terms exist (e.g. integration vs. alignment, supply chain management vs. demand chain management) which further adds to the confusion.

The impact on the studies for this thesis is two-fold.

1. Terms need to be clearly defined, a process for which the foundations have been laid in section 2.2
2. During fieldwork, it is important to be aware that the same language can be used to mean different things and seek clarity of meaning

2.6.2 Scope

Whilst definitions tend to refer to the 'whole chain', more detailed models, frameworks and the limited empirical evidence that exists tend to focus on dyadic relationships. It is important for this thesis to look beyond the dyad and as mentioned in section 2.2.1 it will focus on the four core supply chain processes (Plan-Source-Make-Deliver) from the 'customer to supplier' of the focal firm.

2.6.3 Lack of empirical evidence

Another indicator of the relative immaturity in the field is the lack of empirical evidence. This relates both to the underlying philosophies such as market segmentation as well as the approaches for SC strategy formulation. The majority of frameworks have been theoretically derived and have had cases retrospectively applied to them. Hence there is an opportunity to contribute to knowledge by empirical testing.

3 Research Design Considerations

3.1 Introduction

'The outcome of any serious research can only be to make two questions grow where only one grew before'

Thorstein Veblen (1857 - 1929)

Given the relatively immature nature of CRSC strategy it is not surprising that the literature review in chapter two held true to Veblen's 'hypothesis' and has created more questions than answers. By synthesising the output of key informants, a number of core principles for developing CRSC were identified but these are a theoretical compilation and lack empirical testing. This lack of field testing is just one indicator of the field's immaturity. Other 'gaps' included limited scope and lack of consensual definition. For this thesis to make a relevant contribution to knowledge it must build upon the identified core principles whilst simultaneously addressing the gaps. This is the challenge of developing an effective research design – the focus for this chapter. As illustrated in figure 3-1 this chapter has three key areas.

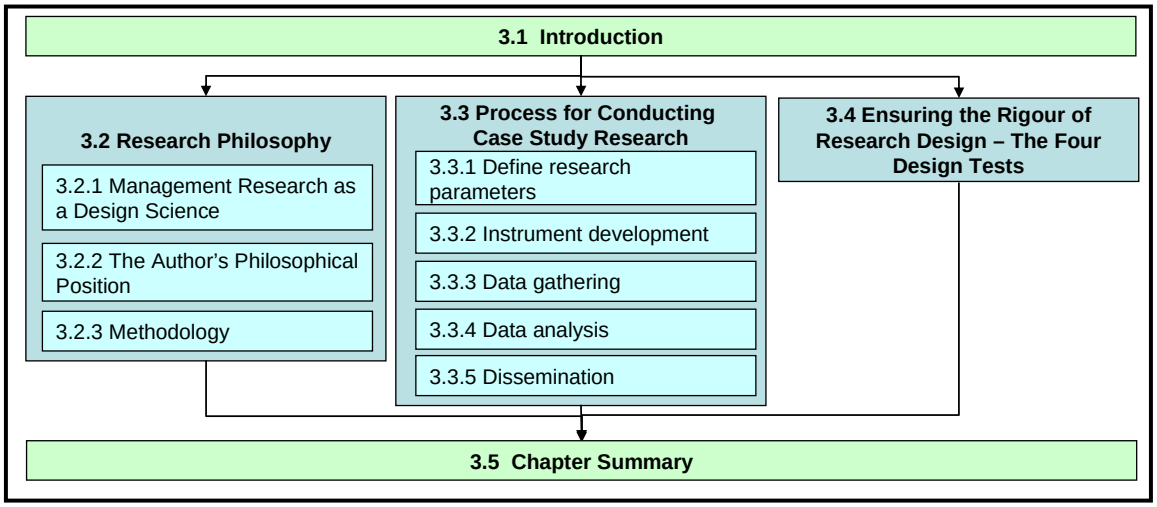


Figure 3-1: Structure for Chapter 3 (Research Design Considerations)

Section 3.2 deals with the issues of research philosophy that are important to management research. It seeks to explain the meaning and importance of ontology, epistemology and methodology and more importantly how these considerations relate to the author's personal beliefs and the rationale for the chosen methodology of multiple case study research. Section 3.3 builds upon this foundation and provides more detail about the process followed for conducting case study research based on a five step approach. Critics of case study research are critical of its rigour. Section 3.4 addresses these concerns by considering the application of four tests that are common to all social science methods (construct validity, internal validity, external validity and reliability) and the chapter concludes in section 3.5 with a summary.

3.2 Research Philosophy

3.2.1 Management Research as a Design Science

Management research by its very nature is embedded in the complexity of the real world of people and organisations which makes it distinct from other types of research. Easterby-Smith, Thorpe and Lowe (1991) suggest that there are three distinguishing considerations:

1. The tension between disciplinary and transdisciplinary approaches (Tranfield and Starkey, 1998). The former is likely to be easier in terms of peer acceptance, the latter in terms of applicability to practising managers.
2. Managers are unlikely to support research activities unless they perceive a potential benefit to their organisation.
3. Management is a combination of theory and practice. Managers not only feel that research needs a practical outcome, they are often able to take action themselves based on the outcome of the study.

These three considerations are the heart of an important evolution that has taken place in the positioning of management research. Until the early 1990's, knowledge production was largely driven by academic agendas and the results stored in disciplinary silos. Gibbons, Limoges, Nowotny, Schwartzman, Scott and Trow (1994) were the first to suggest an alternative to this traditional or mode-1 approach which they termed mode-2. In mode-1 there is a clear distinction between the theoretical core and application. For example mechanical engineering would be considered as the application of the theoretical core of physics and mathematics. Mode-2 however is characterised by (p19):

'…a constant flow back and forth between the fundamental and the practical. Typically, discovery occurs in contexts where knowledge is developed for, and put to, use, while results – which would have traditionally characterised as applied – fuel further theoretical advances.'

Since then there has been broad acceptance of the mode-2 approach by both the European and British Management Journals (eg. Tranfield and Starkey, 1998; Tranfield, 2002). So is mode-2 the right approach for this thesis? Each of Easterby-Smith et al.'s considerations can be addressed by the mode-2 approach. In response to point one, mode-2 would insist upon a transdisciplinary approach. It would also prescribe that the research problem was set and solved in the context of application including theory development and dissemination, addressing points two and three. Supply chain management is considered by Tranfield[34] to be one of four transdisciplinary themes bringing together the disciplines of operations management, marketing and strategy. Furthermore, to advance the study of CRSC strategy given the lack of empirical evidence, scope and 'context specificity' issues identified in chapter 2 of the author's studies would have to be embedded in the context of application.

[34] This was presented as part of his lecture to students on the 2001/02 Research Methodology course on September 27th 2001. The other three are: change management, leadership and e-commerce.

Building upon the mode-2 approach van Aken (2001a; 2001b; 2001c) developed a taxonomy of three types of science; formal, design and explanatory, the key attributes of which are summarised in table 3-1.

Type of science	Formal	Design	Explanatory
Examples	Philosophy, mathematics	Engineering, medicine, management	Natural sciences, large sections of the social sciences
Key question	True or false?	How should things be?	What is the nature of things?
Objective	Building systems of propositions	Solve problems, or improve the performance of existing entities	Describe, explain and possibly predict observable phenomena within a field
Key features	Internal logical consistency	Develop valid and reliable knowledge in the form of field and ground tested technological rules	'True' propositions which are accepted by the scientific forum as true on the basis of proof provided

Table 3-1: Three Types of Science and their Key Characteristics (Van Aken, 2001a; b; c)

He suggests an alternative to the established formal and explanatory sciences – the design science. The key question that design science seeks to address is 'how should things be?' and in so doing solve problems or improve the performance of existing entities. This is achieved by developing field - and ground - tested technological rules. If one subscribes to the concept of design science it follows that a key objective of management research is to develop the strategic frameworks and guiding principles upon which practitioners and consultants can then craft context-specific solutions. The author has an engineering background and is therefore very comfortable with the concept of design science, also believing that this thesis is aimed at improving the development of CRSC strategy and that a key output should be a strategic framework and set of guiding principles that could help practitioners/consultants to develop a CRSC strategy relevant to the context in which it is operated. Thus this helps to the bridge the gap between academia and industry, or more importantly between theory and practice that increasingly management research seeks to address (Pfeffer, 2007; Bartunek, 2007). But how does the concept of design science fit into the wider philosophical debate?

3.2.2 The Author's Philosophical Position

Chia (2002) defines philosophy (p2) as:

'…more a rigorous and enquiring attitude of mind than an academic discipline. In philosophical enquiry, the facts, the theory, the alternatives and the ideals are brought together and weighed against each other in the creation of knowledge.'

Philosophy has two main elements which need to be aligned: metaphysics and epistemology. Metaphysics is concerned with questions of being and knowing and hence questions of ontology – the assumptions we make about the nature of reality (Easterby-Smith et al., 1991). In the social sciences, this relates to the claims being made about social reality (Blaikie, 1993). Epistemology is the general set of assumptions we make about the best ways of enquiring into the nature of reality (Easterby-Smith et al., 1991).

Our philosophical position is not dictated by impartial facts. As noted by Whitehead (1933) p183:

'We inherit an observational order, namely the types of things which we do in fact discriminate; and we inherit a conceptual order, namely a rough system of ideas in terms of which we do in fact interpret.'

These form the 'unconscious metaphysics' (Chia, 2002) that shape our thoughts and approach to sense making. This means that the author's approach to research is inextricably linked to personal philosophical preferences; which in turn are influenced by the embedded collective histories and cultural traditions which have shaped her. It is therefore important to understand her philosophical perspective and the impact.

The author has been brought up in a Western culture. Much of western philosophy is underpinned by two opposing and enduring metaphysical schools of thought that have their roots in ancient Greece: Herclitean and Parmenidean thinking (Chia, 2002). Herclitean ontology is one 'of becoming' and evolves from a view that the world is in a continual state of flux. Its supporting logic is one of understanding. In contrast, Parmenidean ontology is one 'of being' and is based on a view that the nature of reality is permanent and unchanging. It considers reality to be developed from discrete entities with identifiable properties that are underpinned by universal patterns or laws. The underpinning logic is one of causality. Table 3-2 provides a summary of these two contrasting ontologies.

	Herclitean	**Parmenidean**
Ontology	'of becoming'	'of being'
View of reality	Fluxing, changeable and emergent world	Permanent and unchangeable nature of reality
Basic unit of reality	'event cluster'	'atom'
Logic	Understanding	Causality

Table 3-2: Comparison of Herclitean and Parmenidean metaphysical traditions

Despite increasing support for Herclitean thinking, it has been the Parmenidean paradigm that has dominated Western education and hence the author's view of reality. This ontology is underpinned by two contrasting epistemologies identified by William James (1906) as empiricism and rationalism. Empiricism is based on a view that knowledge is created by extrapolating from concrete experience whereas rationalism generates knowledge through logical extrapolation. Neither of these views is without its weaknesses as illustrated in table 3-3 and this has resulted in the emergence of numerous alternative strategies that have sought to combine the strengths of these contrasting epistemological positions.

	Empiricism	**Rationalism**
Ontology	'of being'	
Approach to knowledge generation	Extrapolating from concrete experience	Derived from logical extrapolation
Other labels	Aristotelian	Platonist
Weaknesses	Denies or underplays the significance of hidden universal causes	Unable to penetrate the richness & depth of our empirical experiences

Table 3-3: Comparison of Empiricism and Rationalism

There are numerous traditional and contemporary alternatives that populate the continuum between these two extreme epistemological positions but the one most relevant to this thesis is critical realism. Bhaskar (1978) the father of critical realism believed that there was a difference between a causal law and a pattern of events. Like the layers of an onion, critical realism is based on different layers of reality which can be revealed through the systematic application of science (Chia, 2002). Bhaskar (1978) defines three layers or domains; the empirical, the actual and the real. The empirical is made up of experience and events through observation; the actual includes events whether observed or not; and the real consists of the processes or mechanisms that generate these events. Thus as summarised by Blaikie (1993) p98:

'Realist epistemology is based on building models of such mechanisms such that, if they were to exist and act in the postulated way, they would account for the phenomenon being examined. These models constitute hypothetical descriptions which it is hoped will reveal the underlying mechanisms of reality; these can only be known by constructing ideas about them'.

The author's view of management research as a design science is aligned to the critical realist epistemology, as it seeks to solve problems or make improvements by understanding the underlying rules or mechanisms, whether these are directly observable or not. This is also the view shared by van Aken (2004) who states p241:

'Research in management theory is aimed at developing sound technological rules and at uncovering the generative mechanisms that link (immaterial) intervention with (material) outcomes…such generative mechanisms can be of a material nature, but are mostly of an immaterial, sense-making nature.'

By applying a critical realist epistemology to the studies for this thesis the author will cycle through two of the three research stages (description & explanation) identified by Meredith, Raturi, Amoako-Gyampah, Kaplan (1989). The descriptive phase will be used to capture observations (empirical/actual domains) about the current state of CRSC strategy. The explanatory phase will develop concepts, models and theories (real domain) to try and explain why the current state exists. These relationships are summarised in figure 3-2.

However, this raises questions about the type of methodology that should be used for this thesis that firstly aligns with the author's ontological and epistemological beliefs and secondly will enable her to cycle through the relevant research stages (Meredith et al., 1989). Eisenhardt (2007)p30 suggests:

'…fresh theory that bridges well from rich qualitative evidence to mainsteam deductive research…'…the hallmark of building from case studies....'

The suitability of case study research will now be explored in more detail.

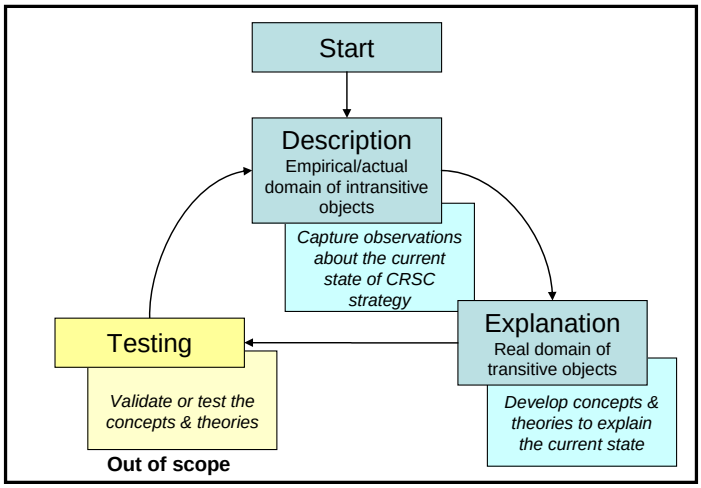


Figure 3-2: Implications of a Critical Realist Epistemology on the Ongoing Cycle of Research Stages (after Meredith et al., 1989 and Bhaskar, 1978)

3.2.3 Methodology

3.2.3.1 Why case study research?

Supporting the wide spectrum of ontological and epistemological beliefs that exist, there is a correspondingly diverse range of research methodologies that can be adopted. The key is to ensure fit between the research agenda and methodology rather than with the researcher per se, though there are obvious benefits if there is a fit between all three elements.

Yin (1994) p13 defines a case study as:

'An empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.'

The objective of this thesis is to empirically study the contemporary phenomenon of customer responsive supply chain supply strategy formulation, a phenomenon that is difficult to distinguish from its organisational context, the supply chain. The contexts in which supply chains operate are truly complex spanning both internal and external organisational boundaries. This complexity, coupled with the paucity of theory, lack of well-supported definitions and metrics adds further support to a case research methodology (Eisenhardt, 1989; Harrison, 2002; Stuart et al., 2002/9). Further fit with the case research approach can be ascertained by considering the nature of the research questions. In general, 'what' questions may either be exploratory (in which case any of the research strategies can be used) or about prevalence (in which surveys or the analysis of archival records would be favoured). 'How' and 'why' questions are likely to favour the use of case studies, experiments or histories (Yin, 1994). Case study research fits well with this project as the research questions are either exploratory 'what' or explanatory 'why' questions[35] focusing on contemporary events in a supply chain environment in which the author has no direct control (refer to table 3-4). This

[35] Though causality is not specifically sought.

also aligns well with the critical realist / design science epistemology, as the 'what' questions can be used to describe the current state in the domains of the empirical/actual and the 'why' questions to help unearth the generative mechanisms that link these domains to the real.

Strategy	Form of Research Question	Requires Control over Behavioural Events	Focuses on Contemporary Events?
Experiment	How, why	Yes	Yes
Survey	Who, what, where, how many, how much	No	Yes
Archival Analysis	Who, what, where, how many, how much	No	Yes/No
History	How, why	No	No
Case Study	How, why	No	Yes

Source: COSMOS Corporation cited in Yin (1994)

Table 3-4: Relevant Situations for Different Research Strategies

Using a case study to address both 'what' and 'why' questions also help to ensure that the first of Dubois and Araujo's (2007) rules for conducting case research are adhered to. They suggest that (p7):

'Case studies are not purely inductive, exploratory tools'

This is also a view shared by Ellram (1996). In this thesis the case methodology is used both as exploratory and explanatory tool.

3.2.3.2 Case Study Design

Even within the bounds of case study research there are several different types of case study design. The favoured approach for this thesis is a multiple case study design. This is also the favoured approach of van Aken (2004) who states p235:

'Through multiple case-studies one can accumulate supporting evidence which can continue until 'theoretical saturation' (Eisenhardt, 1989) *has been obtained.'*

The key advantage with a multiple case study approach is that the evidence from multiple case studies is often considered more compelling, and the overall study is therefore regarded as robust (Herriott and Firestone, 1983). However as discussed by Yin (1994) p46:

'The decision to undertake multiple case study research cannot be taken lightly…each case must be carefully selected so that (a) predicts similar results (a literal replication) or (b) produces contrasting results but for predictable reasons (a theoretical replication)'

Given the context-specific nature of SCM, it is difficult to predict whether contextual factors will lead to theoretical or literal replication. The purpose of multiple case study research adds a deeper dimension to these considerations. The research strategy seeks theoretical replication of the 'generative mechanism' or guiding principles that underpin the chosen area of study, accepting that, due to the context-specific nature of the studies,

literal replication is unlikely. The chosen research design therefore needs to provide the opportunity to:

- Describe the current state of CRSC strategy formulation
- Explain why that current state exists in terms of the underlying mechanisms
- Compare the underlying mechanisms in a number of different supply chain contexts to develop a strategic framework and set of underlying concepts / guiding principles

Taking these requirements into account, the studies for this thesis have been designed based on a three-phase approach as summarised in table 3-5.

Phase		# cases	Objective	Case type	Elapsed Time
1	Pilot case	1	• Describe the current state of CRSC strategy formulation • Explain why the current state exists in terms of the underlying mechanisms • Refine the case study design	Point in time	5-6 months / case
2	Core cases	2	• Describe the current state of CRSC strategy formulation • Explain why the current state exists in terms of the underlying mechanisms	Point in time	5-6 months / case
3	*Cross-case comparison*	*3 (pilot & core)*	• *Compare the underlying mechanisms across the 3 different supply chain contexts to develop a strategic framework and set of underlying concepts / guiding principles*		Ongoing throughout + 1-2 months at end
Total		**3**			

Table 3-5: Summary of Research Phases

There are essentially three cases which form the heart of the study across the first two phases. The purpose of these cases is to describe the current state of CRSC strategy formulation and underlying 'generative mechanism'. The first of these three cases should be considered as a pilot, as it will also be used to refine and develop the research design Ellram (1996). Phase three is the cross-case analysis, which compares the generative mechanisms across the three cases to develop a strategic framework and set of guiding principles. Decisions regarding the number of cases to include in the research design were made for practical reasons in terms of time, access and money, and were felt to be the minimum required to meet the research objectives. With the logic and outline of the multiple case study methodology in place, it was then possible to develop a more detailed process for conducting the case study research used in this thesis.

3.3 A Process for Conducting Case Study Research

Wacker's (1998) review of research methods in operations management found that only 8% of over 2000 papers published over the last five years used a case study methodology. As commented by Yin (1994) p9:

'…case studies have been viewed as a less desirable form of enquiry than either experiments or survey. Why is this? Perhaps the greatest concern has been over the lack of rigor of case study research.'

To mitigate against this lack of rigour and hence to improve the acceptance of case based research, a number of different processes for conducting case study research have

been designed. Notable contributors include Flynn, Sakakibara, Schroeder, Bates and Flynn (1990) who developed a six-stage systematic approach for empirical research, whilst Yin (1994) and Stuart, McCutcheon, Handfield, McLachlin and Samson (2002/9) preferred a five-stage process model. As illustrated in figure 3-3, the Flynn et al. and Stuart et al. approaches are virtually identical. The Flynn model is not restricted to case study design and so includes an additional step to enable the selection of a research design. The Yin approach covers the same basic steps but provides a further level of detail in terms of practical considerations.

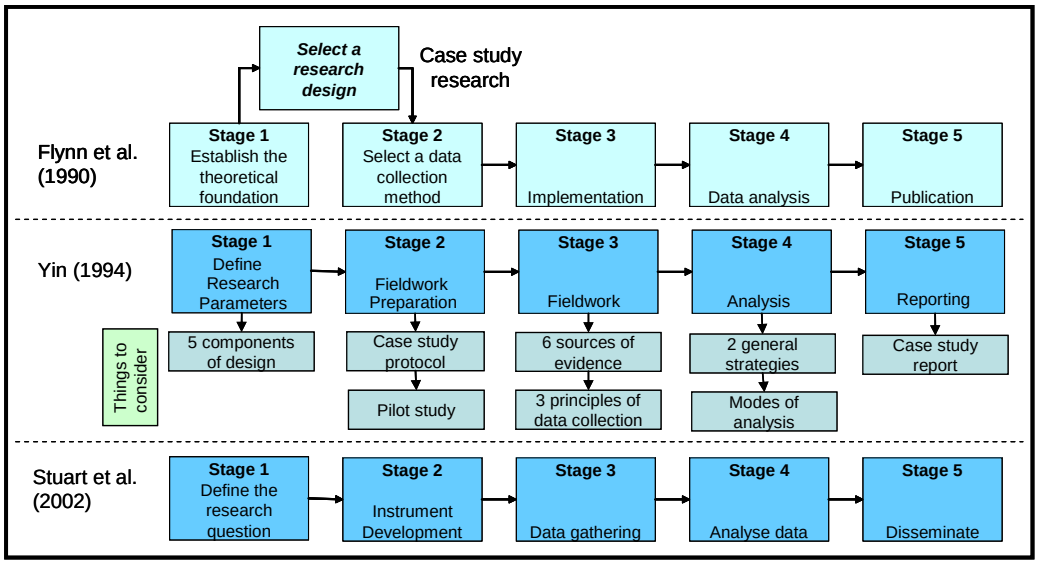


Figure 3-3: Comparison of different empirical research processes

The process used for this thesis is based on a five stage approach that uses the nomenclature of Stuart et al. The exception is the first stage of the process 'define research parameters' – a term favoured as the initial definitions required to establish the theoretical foundation are beyond the research questions. This five stage approach is applied to the three phases of research as summarised in figure 3-4.

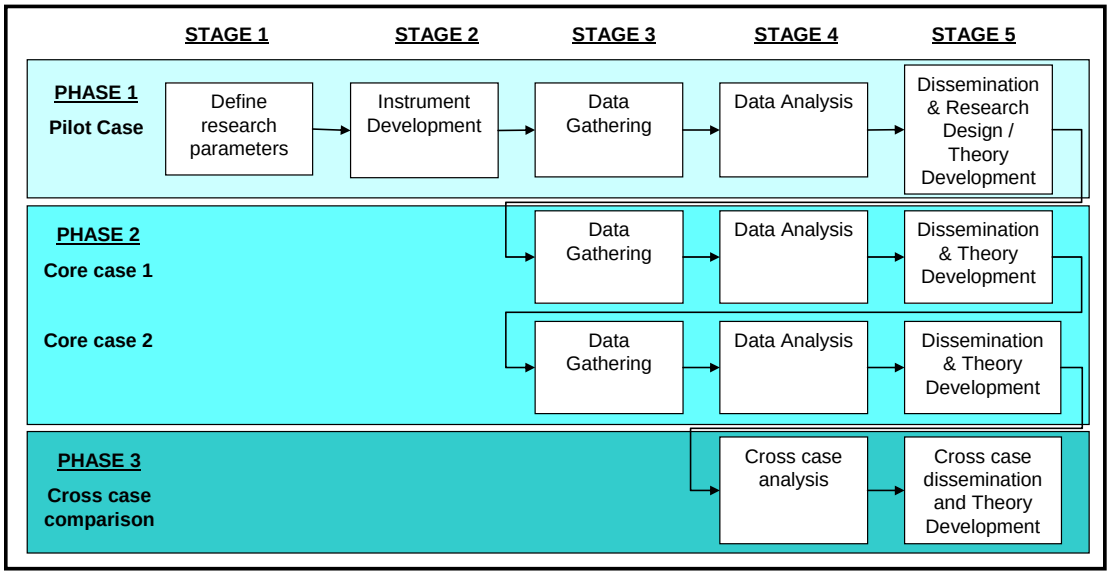


Figure 3-4: Combining the Phases and Stages of the Research Design

In the context of the studies for this thesis, each of these five stages is now described in detail as they relate to the three phase research design – pilot case, core cases and cross-case analysis – which are all concerned with the descriptive and explanatory aspects of theory building.

3.3.1 Define Research Parameters

Yin (1994) defined three components of research design that are relevant to the first stage of the process: research questions, hypotheses and unit of analysis. Each of these will now be discussed in turn.

3.3.1.1 Research Questions

The research questions need to encapsulate the objectives detailed in table 3-5 and will seek to guide the research activities across all three phases of the research design. Two sets of research questions have therefore emerged directly relates to the study of CRSC strategy. The first set of four questions seeks to describe the current state (CS) of CRSC strategy formulation and its underlying mechanisms. These are:

CS1.	What approaches to customer segmentation and supply chain strategy formulation are currently adopted?
CS2.	Why have these approaches been adopted?
CS3.	What is the relationship between current approaches to customer segmentation and supply chain strategy?
CS4.	Why has this relationship developed?

The second set addresses the future potential (FP):

What is the potential for increased 'customer responsiveness' by adopting:	
FP1.	A customer focused approach to segmentation?
FP2.	A customer led approach to supply chain strategy formulation?

The questions can be considered in 'pairs' of a descriptive 'what' and an explanatory, 'why'. By developing a series of 'what' and 'why' style questions, greater clarity and explicitness has been achieved, whilst maintaining a style of questioning that supports the exploratory case based nature of the research design (Yin, 1994). The relationship between the research questions is summarised in figure 3-5.

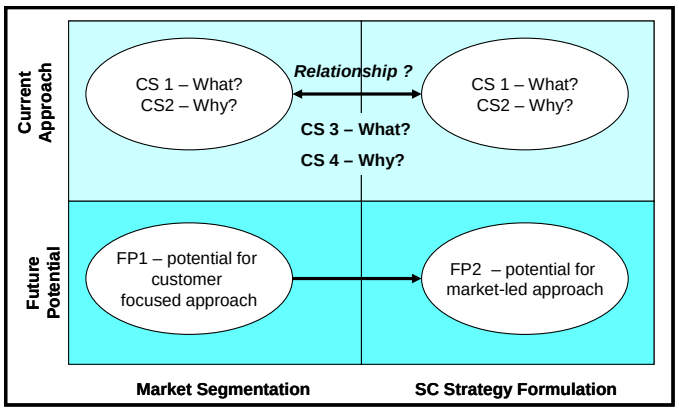


Figure 3-5: Relationship between Research Questions

3.3.1.2 Supporting Hypotheses

A number of core principles for developing CRSC strategy were synthesised from the literature and are summarised in section 2.5.4. Based on these principles, a number of hypotheses that outline the 'ideal' expected responses to the current state 'what' questions posed in this thesis have been developed. There are three questions which are summarised in table 3-6. It is the gap between the 'ideal' hypotheses and reality that the FP questions seek to address. This implies that the hypothesised state may not fully exist in practice.

Research Question		Hypotheses – The 'ideal'	
CS1	What approaches to customer segmentation and supply chain strategy formulation are currently adopted?	HCS1	Customers are segmented based on buying behaviour driven by an understanding of customer value.
		HCS2	Supply chain strategy is developed in response to the customer segmentation strategy.
CS3	What is the relationship between current approaches to customer segmentation and supply chain strategy?	HCS3	There is a direct link between customer segmentation and supply chain strategy. Different behavioural segments drive different supply chain strategies.

Table 3-6: Link between Research Questions and Hypotheses of the 'Ideal'

The hypotheses also have a direct link to the theoretical framework introduced in section 2.5.3. As illustrated in figure 3-6, HCS1 suggests the 'ideal' approach to market segmentation emerging from the literature is based on buying behaviour. This in turn drives the supply chain strategy as hypothesised by HCS2. This implies that there is a direct relationship between customer segmentation and supply chain strategy as stated by hypothesis HSC3.

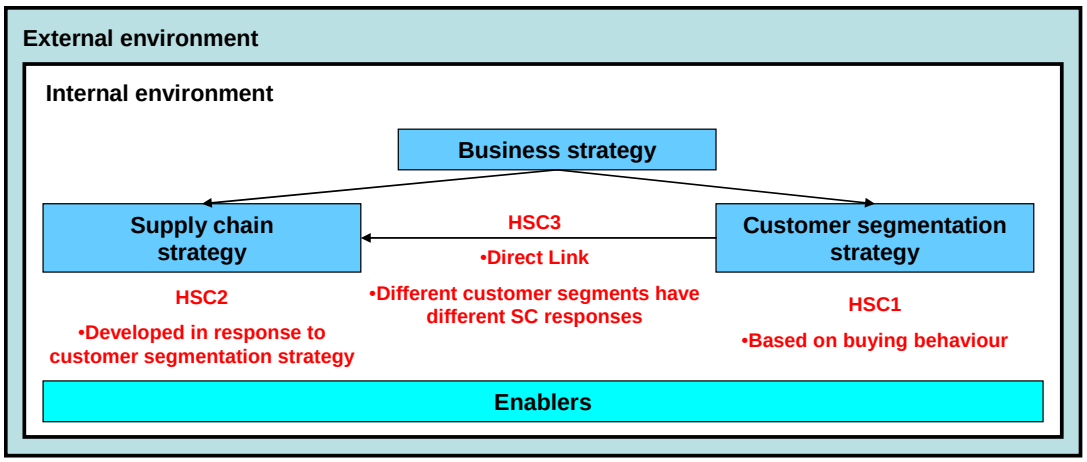


Figure 3-6: Link between Emerging Theoretical Framework and Hypotheses of the 'Ideal'

3.3.1.3 Unit of Analysis

The literature review in chapter two identified that a limitation of most supply chain studies has been that they address only a focal firm, or at best a dyadic relationship. An important aspect of the author's study is that it crosses a minimum of two organisational boundaries and includes at least three different organisations within the supply chain. Whilst each case study is developed around a focal firm, these companies provide the

focal point for a supply chain investigation which transcends the boundaries of both their customer and supply base. For this reason, a process orientated unit of analysis has been developed based on the SCOR® model – as discussed in section 2.2.1 – that considers the conversion of demand into supply across the supply chain as illustrated in figure 3-7. Given the context-specific nature of supply chain management, the unit of analysis also includes an understanding of the external environment in which the supply chain operates.

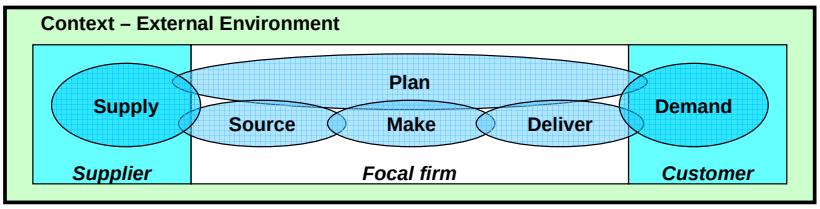


Figure 3-7: Unit of Analysis

3.3.2 Instrument Development

There are three main elements to successful instrument development: case study selection, instrument selection and the case study protocol. Each of these will be discussed in turn.

3.3.2.1 Case study selection

The studies for this thesis are a subset of a broader three year Engineering and Physical Sciences Research Council (EPSRC) funded project entitled 'Developing the Capabilities of Customer Responsive Supply Chain Strategy'[36] or DeCoRs for short. This was a joint project between Cranfield University and the Open University (OU) with Cranfield focusing on the 'technical' aspects and the OU on the 'behavioural'. The author was the only research fellow working on the project at Cranfield and her supervisor was the project Principal Investigator (PI). There was a clear understanding by all members of the project team that data from the 'technical' element of the project would be used for this thesis. The author was directly involved in the collection of this data and performed her own independent analysis. This was not difficult given her responsibility for the technical aspects of the project and the somewhat divergent nature of the lens through which Cranfield and the OU viewed the project. In this way the author was able to achieve synergy between studies for this thesis and the broader research project. The DeCoRs project was focussed on the supply chains of six focal companies with a range of roles in the supply chain including; manufacturer, retailer and logistics provider. The focal companies were drawn from membership of the Agile Supply Chain Research Club (ASCRC) at Cranfield and therefore had a predisposition to the concepts of agility and customer responsiveness. The author chose to base her studies on only three of the six DeCoRs cases as these were the ones in which she was directly involved and played the leading role in their development. Table 3-7 provides a summary of the attributes of all six cases that formed DeCoRs and indicates which cases have formed the basis for this thesis.

[36] Grant number: GR/N34406/01

Foal Firm			Total No. Companies	No. Interviews	PhD
Name	**Role in SC**	**Sales**			
CleanCo	Manufacturer	£115m	5	49	Pilot
TelevisionCo	Manufacturer	$2.4bn	8	27	
4PLElectronicsCo	Lead Logistics Provider	$1.7bn	6	19	Core case 1
ElectronicsCo	Manufacturer	$4.1bn	2	40	
PharmaCo	Reatiler	£4.3bn	3	16	Core case 2
4PLDrinksCo	Logistics Provider	£30m	6	31	
Total			**30**	**181**	

Table 3-7: Case Study Dimensions for DeCoRs and this thesis

3.3.2.2 Instrument selection

As summarised in table 3-8, Yin (1994) identifies six different sources of evidence (and their relative strengths and weaknesses) that can be used as part of case study research; documentation, archival research, interviews, direct observation, participant observation and physical artefacts. The primary source of evidence or instrument for this thesis was semi-structured interviews. Interviews have the benefit of allowing the researcher to focus directly on the subject for investigation whilst also providing the opportunity for the interviewee to provide perceived causal inferences (Yin, 2004). The importance of the interview is summarised by Burgess (1982) p73 as:

'The opportunity for the researcher to probe deeply to uncover new clues, open up new dimensions of a problem and to secure vivid, accurate inclusive accounts that are based on personal experience.'

Source of Evidence (Role in this thesis)	Strengths	Weaknesses
Documentation (Secondary)	• Stable – can be reviewed repeatedly • Unobtrusive – not created as a result of the case study • Exact – contains exact names, references, and details of an event • Broad coverage – long span of time, many events and many settings	• Retrievability can be low • Biased selectivity, if collection is incomplete • Reporting bias – reflects (unknown) bias of author • Access – may be deliberately blocked
Archival research (Secondary)	• Same as above for documentation • Precise & quantitative	• Same as above for documentation • Accessibility due to privacy reasons
Interviews (Primary)	• Targeted – focuses directly on case study topic • Insightful – provides perceived causal inferences	• Bias due to poorly constructed questions • Response bias • Inaccuracies due to poor recall • Reflexivity – interviewee gives what interviewer wants to hear
Direct Observation	• Reality – covers events in real time • Contextual – covers context of event	• Time-consuming • Selectivity – unless broad coverage • Reflexivity – event may proceed differently because it is being observed • Cost – hours needed by human observers
Participant Observation	• Same as above for direct observations • Insightful into interpersonal behaviour and motives	• Same as above for direct observations • Bias due to investigator's manipulation of events
Physical Artefacts	• Insightful into cultural features • Insightful into technical operations	• Selectivity • Availability

Table 3-8: Six Sources of Evidence – Strengths & Weaknesses

Given that the studies for this thesis seek not only to describe the 'messy reality' of CRSC strategy but also to 'probe deeply' to understand the reasons why this exists, interviews are an effective primary source of evidence. The necessity to probe more deeply, based on the response, was a major consideration in determining the degree of

structure in the interview design. As suggested by Easterby-Smith et al. (1991) p75 quoting Jones (1985)

'Although researchers are to some extent tied to their frameworks they shouldn't be 'tied up' by them.'

One solution to this problem suggested by Easterby-Smith et al. is to prepare a topic guide that can be used as a loose structure for the questions. This is a valid approach for an experienced researcher with a well defined area of study but in the early days of the doctoral studies, the author was a relatively inexperienced researcher dealing with a complex area of study. The preferred approach was to develop a semi-structured interview protocol.

The drawback to using interviews is that they can introduce bias through poor question construction, interviewer bias, and inaccuracies due to poor interviewee recall or reflexivity (Yin, 1994). Steps were taken to mitigate each of these risks. In order to reduce bias through poor question construction a semi-structured interview protocol was developed and reviewed by the wider DeCoRs team. This included two professors who had expertise in case based research. Careful question construction also helped to mitigate interviewer bias as questions were constructed to ensure that where possible they were open ended. Probes were an important part of the research and where this could not be mandated in the semi-structured interview protocol the author was mindful of the seven types of probe discussed by Easterby-Smith et al. and tried to follow these examples where possible. These probes are summarised in table 3-9. As a final check, the transcripts of the first three interviews in the pilot were reviewed and questions modified where appropriate. Fortunately minimal changes were required in spite of the author having a tendency to reflect on her own personal practice in agreement with the interviewee. The semi-structured interview also provided the flexibility to request secondary sources of archival and documentary evidence which aided data triangulation and the minimisation of bias through poor interviewee recall or reflexivity.

Type of probe	Use
Basic	• Repeat the initial question • Useful when interviewee is wandering
Explanatory	• Building on incomplete or vague statements • Ask questions such as: 'What did you mean by that?' 'What makes you say that?'
Focused	• Used to obtain specific information • 'What sort of…?'
Silent	• Effective when the respondent is either reluctant or very slow to respond • Simply pause, and let them break the silence
Drawing out	• Used when interviewee has dried up • Simply repeat last few words of previous sentence • 'Tell me more about that…'
Giving ideas or suggestions	• 'Have you thought about…' 'Have you tried…?' 'Perhaps you should ask…?'
Mirroring or reflecting	• Expressing in your own words what the respondent has just said • Very effective as it may force the respondent to rethink their answer

Table 3-9: Types of Probe (Easterby-Smith et al. 1995)

3.3.2.3 Case study protocol

A case study protocol is a comprehensive approach to defining the procedures / general rules that govern the use of the selected research instruments. Its purpose is to increase reliability and, given that the research design for this thesis is based on a multiple case

study, the use of a case study protocol is essential (Yin, 1994). As mentioned previously, the studies for this thesis are essentially the technical element of the DeCoRs research project. In order to ensure that from a project perspective both the technical and the OB elements aligned, a decision was taken to develop one case study protocol for the project which encompassed all of the technical elements that were required. Whilst there was a common core to all three case studies it was necessary to flex the approach on a case by case basis to include the company-specific objectives that were essential to gain access. These relationships are summarised in figure 3-8.

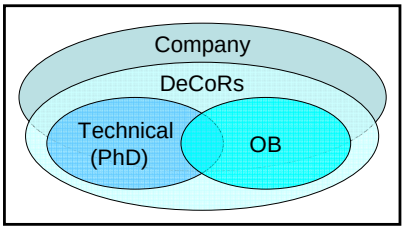


Figure 3-8: Relationship between Company, DeCoRs and this thesis

There were three main elements to the case study protocol: field procedures, interview protocol and reporting protocol. Each element will now be discussed in turn.

3.3.2.3.1 Field Procedures

Given the breadth of the unit of analysis from customer through the focal firm to supplier, a four phase approach to the fieldwork was developed to ensure that focus was maintained. Pettigrew (1992) stresses the need for a 'meta level' analytical framework for process research in strategic management. Whilst his preferred research design is longitudinal case studies there are three key learnings applicable to process research in CRSC strategy. The first is the need to understand the context in which the processes are embedded; this is both in terms of the external competitive environment (outer context) and the internal context of the focal firm and its associated supply chain (inner context). The second is clear definition of the research 'content' or processes under investigation and their associated outcome variables. The third is the need to understand the interconnectedness of these three key components i.e. the way in which contextual factors can enable or inhibit the ability of the supply chain processes to perform. Following the advice of Pettigrew, the fieldwork for this study was designed to accommodate these principles resulting in four phases of engagement. The first phase of engagement is exploration and definition. This was necessary given the breadth of the unit of analysis and context-specific nature of the supply chain. The purpose was to secure the commitment of the focal firm to the research which usually required the development of some company-specific research questions. It also provided an opportunity to finalise the approach, resources and timings for phase 2 – the scoping study. Whilst this phase required a relatively small amount of 'task time' – a maximum of one week – the elapsed time was much longer. This is because this phase of the project was mainly concerned with building relationships and commitment, and this is a protracted process. Typically the elapsed time for this phase was two months as indicated in table 3-10. The objective of the scoping study or research context phase has two main objectives. Firstly to understand the outer and inner contexts in which the supply chain of the focal firm operates and secondly to define the research focus and

key informants for the main part of the study – phase 3. Defining the research focus was a crucial part of the fieldwork as it provided the lens – in terms of customers, products and suppliers – through which the market segmentation and supply chain strategy processes would be studied in more detail.

A 'paired' approach was favoured and customers, products, and suppliers were selected that represented polar extremes within the research context whilst remaining representative and strategically important to the focal firm. This was a crucial element of the research design as such differences were perceived to test the need for a differentiated approach. Typically the actual scoping study required 2-3 days in the field but the task time increased to around 2 weeks when preparation, analysis and report writing were included. The elapsed time before the main study commenced was in the order of one month as within this time frame diary availability was usually suitably free to enable a more consolidated approach to the fieldwork for the main study. During the main study the research content and outputs phase was the most intensive part of the study. It began by exploring the approaches to market segmentation and supply chain strategy development within the focal firm before extending the investigation to customers and suppliers (which included logistics providers). This included the collection of the output measures of supply chain performance when they were available.

Phase		Application to Pettigrew (1992) analytical framework	Main Objectives	Task Time (indicative)	Elapsed Time (indicative)
1	Exploration & definition		• Obtain commitment of focal firm to embark on the study • Identify any focal firm specific research questions • Finalise the approach / resource / timings for the scoping study	1 week	2 months
2	Scoping Study	Context	• Understand the competitive environment of the focal firm (outer context) • Supply chain overview - Understand the supply chain structure and basic dimensions of the supply chain for the focal company (inner context) • Determine a focus for the main study (i.e. 2 customers, 2 products and 2 suppliers) • Identify the key informants for the main study	2 weeks	1 month
3	Main Study	Content (What?)	• Understanding of the current approach to customer segmentation and drivers of this approach • Understanding of the key supply chain processes and their contribution to supply chain strategy • Drivers of difference within each supply chain process and across the supply chain strategy more generally	2 months	2 months
		Outputs	• Supply chain performance measures		
4	Verification		• Verify the analysis and conclusions of the study with the focal firm	2 weeks	1 month

Table 3-10: Summary of Four Phases of Fieldwork - Objectives and Time

The intensity of this phase of the research is reflected in the parity between the task and elapsed time. Whilst actual fieldwork comprised around 2-3 weeks of the task time, field notes, analysis and report writing took a further 4-6 weeks. Phase 4 was the final verification phase in which the analysis and conclusions from the study were shared with the focal firm. The preferred route was through a 1-day workshop but this was only possible with one of the three cases. The alternative was through the issue of a technical report to the focal firm for validation.

With the framework for the fieldwork procedures in place, the next step in instrument development is to describe the case study questions in more detail. Given that the primary research instrument for this thesis is the semi-structured interview, this takes the form of an interview protocol.

3.3.2.3.2 Interview Protocol

The interview protocol had two main elements: the interview schedule and work breakdown structure. The interview schedule was comprised of a series of main headings which acted as topic guides supported by a list of more detailed questions. These constituted a comprehensive set of probes that could be selected by the interviewer depending on how the interview developed. There was also the flexibility to veer from the list to probe more deeply into areas of particular interest and to request archival forms and documentary sources of secondary evidence to support the points being made. There was a common core to the topics covered by the interview schedule though there were also some questions that were role-specific. At the start of the interview schedule there was a guide that indicated which sections of the schedule were relevant to which interviewees, as illustrated in table 3-11. A full copy of the interview schedule can be found in appendix 1.

Section	Topic	Phase	Interviewees
1	Environment • *Internal* • *External*	Scoping study	Senior management with a business & SC overview
2	Supply Chain Overview • *Plan* • *Source* • *Make* • *Deliver*	Scoping study – but only at a top level to enable navigation around the SC & a research focus to be identified for the main study. This will be validated in more detail in the research content phase	Senior management with a business & SC overview
		Main study (focal firm)	Heads of key SC processes (Plan, Source, Make, Deliver)
		Main study (customers & suppliers) but only for relevant processes as identified during fieldwork.	Key interfaces with focal firm identified through fieldwork
3	Supply Chain Relationships • *Internal* • *Customer* • *Supplier*	Main study	Heads of key SC processes (Plan, Source, Make, Deliver), Head Sales/Marketing and key interfaces (e.g. NPI and customer service)
		Main study (customers & suppliers) but only for relevant relationships as identified during fieldwork.	Key interfaces with focal firm identified through fieldwork
4	Process management • *Product & process development* • *Information management*	Main study	Heads of key SC processes (Plan, Source, Make, Deliver), Head Sales/Marketing and key interfaces (e.g. NPI and customer service)
		Main study (customers & suppliers) – their perspective on focal firm	Key interfaces with focal firm identified through fieldwork
5	Customer Responsiveness	Scoping study	Senior management with a business & SC overview
		Main study	Heads of key SC processes (Plan, Source, Make, Deliver, Head Sales/Marketing and key interfaces (e.g. NPI and customer service)
		Main study (customers & suppliers) – their perspective on focal firm	Key interfaces with focal firm identified through fieldwork

Table 3-11: Interview schedule – summary of structure, content and interviewees

The second element of the interview schedule was a work breakdown structure that identified more specifically the key informants for the research, the interviewer, the time and the location for the interview. This was a living document that started as a generic template for each case and was updated to become increasingly case-specific as

the scoping study identified the research focus and key informants. The work breakdown structure (WBS) was a crucial element of the interview protocol and was appended to the main project document, which will be described in more detail in section 3.4. An extract from a WBS is displayed in table 3-12 and a full example can be found as part of the project document in appendix 2.

4PLElectronicsCo			
Planning	Demand Planning Supply Planning	Operations Manager	2 days 29/05/02 and 30/05/02 CE/ JG
Source	Supplier Management Inbound Logistics	Transport Manager,	
Make	Processing Packing	Operations Manager	
Deliver	Customer Service Distribution Management	CH TB Transport Manager, KG	
Product & Process Change		FH	
Information / Account management		Account Manager	

Outbound1			
Supply Chain & Relationship Overview	Plan, Source, Make, Deliver	Strategic Account Manager	1 day 11/06/02 JG

Table 3-12: Extract from a Work Breakdown Structure (WBS) for the 4PLELectronicsCo Case

3.3.2.3.3 Reporting Protocol

An element of the case study protocol frequently overlooked is the reporting protocol. Whilst this may appear to be a little out of sequence it is beneficial to have a plan of the types of report and their intended audience at the outset of the research (Yin, 1994). The reporting protocol for this thesis, as shown in figure 3-9, had three primary audiences: the case company, the project team and the wider academic community.

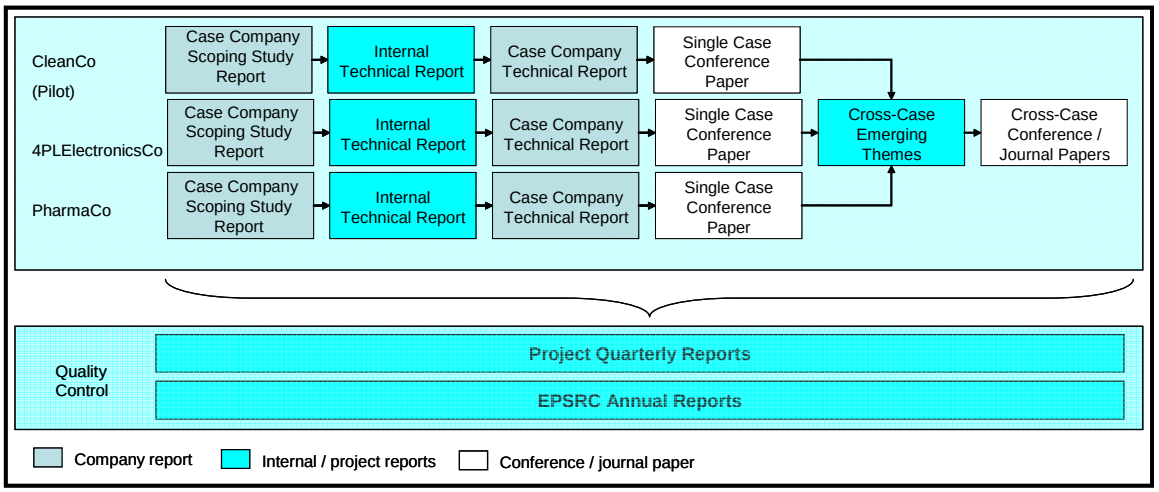


Figure 3-9: The Reporting Protocol

The purpose of reports for the focal case study companies was to feedback results and to seek verification. This happened twice, at the end of the scoping study and the main

study. Reports aimed at the project team served two purposes. The first was to provide a summary of the technical analysis for each of the individual case studies after the main study was complete, and also for the emerging technical cross-case analysis. The second was to provide an input into the quarterly project reports and annual EPSRC reports that were required as part of the Quality Assurance (QA) procedures for the wider DeCoRs project.

With findings verified by both the focal firm and the project team, final verification was sought from the wider academic community. For individual cases this was in the form of conference papers primarily aimed at the Logistics Research Network (LRN) and International Symposium of Logistics (ISL) audiences. At the cross-case comparison stage publication in reputable journals was sought. This included 'The International Journal of Logistics: Research and Applications' (IJOL) and 'The International Journal of Operations and Production Management' (IJOPM). A summary of the publications directly relevant to this thesis is summarised in table 3-13.

Phase	Focus	Conference / Journal	Title	Authors	Year	Vol Page No.
Pilot case	CleanCo	LRN	Strategy in an FMCG Supply Chain	Godsell & Harrison	2002	pp521 - 528
Core Case 1	4PLElectronicsCo	ISL	Supply chain management: putting the end customer first	Godsell & Harrison	2003	pp699 - 704
Core Case 2	PharmaCo	ISL	From prescription drugs to Christmas mugs: a challenge for customer responsive supply chain strategy	Godsell & Harrison	2004	pp48 - 56
Cross-case	All	ISL	Demand chain management: The missing link?	Godsell, Harrison, Christopher & Juttner	2005	pp63 - 71
		IJOL	Customer responsive supply chain strategy: an unnatural act?	Godsell, Harrison, Emberson & Storey	2006	Vol. 9, No. 1, pp47 - 56
		IJOPM	Supply chain management: theory, practice and future challenges	Storey, Emberson, Godsell & Harrison	2006	Vol. 26, No. 7, pp754 - 774

Table 3-13: Summary of Relevant Conference and Journal Papers

3.3.3 Data Gathering

Yin (1994) proposes three interdependent principles that underpin the data collection stage:

1. Use of multiple sources of evidence
2. Create a case study database
3. Maintain a chain of evidence

The application of each of these principles to the studies for this thesis will now be discussed in turn.

3.3.3.1 Use of Multiple Sources of Evidence

Data gathering was in the form of fieldwork. As mentioned previously the primary research instrument was semi-structured interviews which were developed in line with an interview protocol. In addition to this there was a protocol for how the interviews were administered in the field. Firstly, if at all possible, a private and neutral space was found in which to conduct the interviews. This was usually in the form of a meeting room that was booked for the duration of the fieldwork. The second step was to request

from the interviewees that the interviews were recorded using a mini-disc recorder. It was possible to record around 90% of the interviews. All interviews were conducted with two researchers present. This enabled one researcher to take the lead in asking questions whilst the other could take a more reflective view on the manner in which the interview was developing and intervene if necessary. The author took notes during the interview and turned them into word based 'contact notes' using a format suggested by Miles & Huberman (1994) within twenty-four hours of the interview taking place. The contact note template is illustrated in figure 3-10. The first eight interviews from the pilot study were also transcribed. This was to enable the accuracy of the contact notes to be checked against the actual interview dialogue. As illustrated in appendix 3[37] the accuracy of the contact notes was found to be very high. A decision was then taken to use contact notes as the primary source of raw data with the recorded interviews being available as backup if further detail was required.

CLEANCO

FIELDWORK - CONTACT NOTES

Interviewee		Transcript No.	
Job Title		Date	
Contact Details		Location	

1.0 INTERVIEWEE BACKGROUND

2.0 MAIN ISSUES OR THEMES ARISING

3.0 SUMMARY OF INFORMATION GATHERED

4.0 OTHER SALIENT, INTERESTING, ILLUMINATING OR IMPORTANT ASPECTS

5.0 NEW/OUTSTANDING QUESTIONS FOR NEXT VISIT

6.0 SECONDARY DATA

Figure 3-10: Contact Note Template (after Miles & Huberman (1994))

Where possible, secondary data in the form of documentation (e.g. reports of previous studies, memoranda, e-mails) and archival records (e.g. organisation charts, process flow diagrams, KPIs) were sought to triangulate the primary data. Sources were recorded in section 6.0 of the contact notes.

3.3.3.2 Create a Case Study Database

In order to keep track of the primary and secondary data sources, a case study database was formed. Contact notes were all electronic and secondary sources of data were also requested in electronic format. If this was not possible, hard copies were scanned to create electronic versions. All documents were then stored in a project specific folder, the format of which was common to all cases to enable easy navigation. A summary of

[37] This appendix compares an excerpt from the transcript of GCh, Purchasing Executive for CleanCo, with the relevant parts of the contact notes.

case documents was produced in word format and held in the project folder. A full example of a case study database summary can be found appended to the project document in appendix 4. A summary excerpt is illustrated in table 3-14.

Date & Location	Ref	Interviewee	
		Name	Role
July 2001 Head Office	N#01 / T#01	DA	Business Process Controller
	N#02 / T#02	BB	Customer Quality Manager
	N#03 / T#03	CI	Marketing Information Manager
	N#04 / T#04	GCh	Senior Purchasing Executive
	N#05 / T#05	PB	Logistics Controller
	N#06 / T#06	GCr	Business Development Manager (Contract Sales)
	N#07 / T#07	DA	Business Process Controller (Planning)
	N#08 / T#08	GT	General Manager, Factory 2
	N#09	LU	NPD Controller
	N#10	DL	National Field Sales Controller
	N#11	DS	Business Development Manager – (ex ValCo)
	N#12	MJ	Deputy Managing Director
October 2001 Manufacturing Site	N#13	ML	Logistics Planning Manager
	N#14	PB	Process Manager, Factory 1
	N#15	PM	Perpetual Inventory Auditor
	N#16	DC	Logistics Manager, Factory 1
	N#17	PT	Training and Development Manager, Factory 1
	N#18	Contact note numbers not used due to Researcher error. No contacts notes have been omitted purely an administrative error.	
	N#19		
	N#20		
November 2001 Head Office	N#21	ES	Senior Purchasing Executive
	N#22	PMe	Purchasing Manager, fats & oils
	N#23	JW	Packaging Development Manager
	N#24	JC	Customer Service Logistics Manager
	N#25	IW	Business Development Manager
January 2002 Main Warehouse	N#26	DD	Interim Logistics Development Executive
	N#27	PMo	Customer Service Manager
	N#28	JL	Stock Audit Manager, Warehouse
Miscellaneous	28/06/01	DA	Business Process Controller : Scoping meeting notes
	17/10/01	JM	General Manager, Factory 1 : Interview
	18/10/01	PB	Process Manager, Factory 1 : Factory tour notes
	18/10/01	DW	Personnel Manager, Factory 1 : Interview
	10/01/02	JL	Stock Audit Manager, Warehouse
	21/11/01	SM	Customer Service Logistics Manager

T= Transcript, N= Contact Notes from recorded interviews, Date = unrecorded interview

Table 3-14: Excerpt from Primary Data Summary for CleanCo Case Study

3.3.3.3 Maintain a Chain of Evidence

The chain of evidence for this study is a combination of the documentation recorded within the case study data base and the reports within the reporting protocol. There were six links in the chain of evidence for each individual case and a further two links for cross-case comparison as summarised in figure 3-11. Arguably the most important documents in the chain of evidence (COE) are the case contact notes which form the second link in the chain. Given their importance, an example of a full set of contact notes for one interview is listed in appendix 5. The inputs to these (link I1) are primary data from the interview in the form of sound recordings and field notes, and supporting secondary archival and documentary evidence.

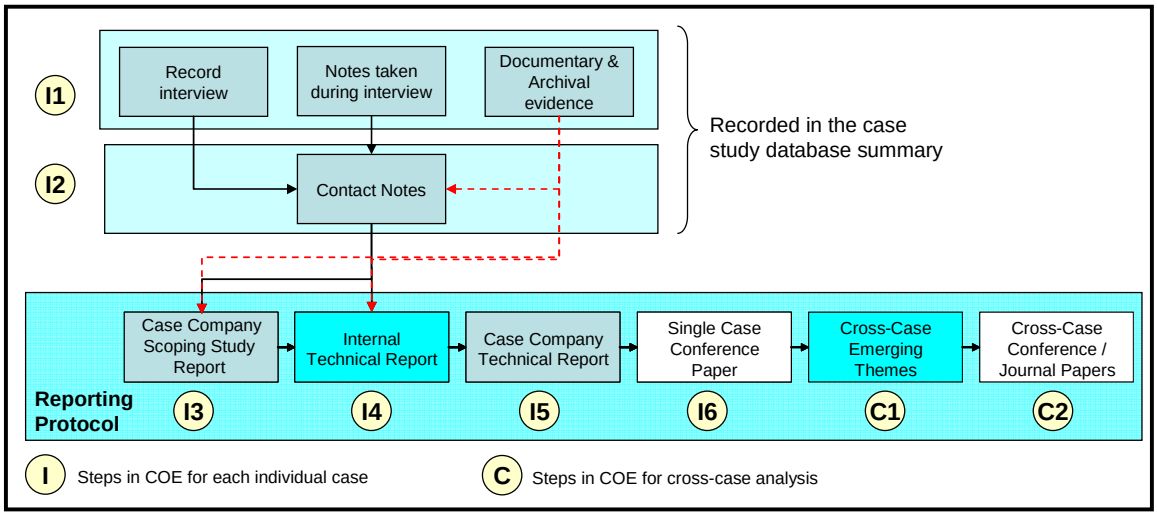


Figure 3-11: Summary of the Chain of Evidence for Individual Cases & Cross-Case Comparison

The analysis of the contact notes and supporting secondary data then forms the input to the final four links (I3-I6) in the COE for individual cases which in turn feeds the links in the cross-case analysis COE (C1-C2); these were described in section 3.3.2.3.3, the reporting protocol.

3.3.4 Data Analysis

The approach to data analysis used for this thesis was aligned to the reporting protocol. Whilst the analysis was refined and developed into a number of different formats for verification and dissemination, there were essentially two key types of analysis: individual and cross-case analysis.

3.3.4.1 Individual case

The analysis followed the same format for the pilot and core cases. At the end of the scoping study, a report was produced that provided a summary of the outer and inner context, the research focus for the main study and insight on any company specific questions. This was a descriptive analysis based on information derived from direct questioning as part of the scoping study. Given the practitioner audience, the content of these reports was relatively brief e.g. the CleanCo scoping study report was eleven pages, with a further four pages of appendices. The contents page from the CleanCo scoping study report is summarised in figure 3-12. Because of the context-specific nature of supply chain management, whilst the general structure of the scoping study reports remained the same, the format flexed to accommodate the specific case e.g. inter-company, contract business, glycerine, were specific aspects of the CleanCo case context.

Figure 3-12: Table of Contents from CleanCo Scoping Report

The second and most important piece of individual case analysis to be produced was the internal technical analysis which was performed at the end of the main study. This was an in-depth analysis and the report was much longer. The CleanCo technical report was thirty-five pages long and covered an in-depth review of the supply chain context and strategy, key processes and behavioural segmentation. The key elements of each of these sections are summarised in the table of contents for the CleanCo technical report in figure 3-13.

Figure 3-13: Table of Contents from CleanCo Technical Report

The analysis was once again based on a review of the contact notes and supporting documentation. Sections 1.0 and 2.0 were descriptive and addressed the current situation research questions (CS1-4). It used a number of different techniques to describe the case context, strategy and key processes. This included process flow diagrams, narrative, summary tables and diagrams. Section 3.0 looked at the future potential research questions (FP1 and 2) and also considered the enablers and inhibitors to this state being reached. This was a more explanatory type of analysis and was more reliant on content analysis and the use of data arrays. Where possible the data used were referenced back to the original contact notes by name and number. Examples of how data were extracted from the contact notes and used in the technical analysis can be found in appendix 6.

3.3.4.2 Cross-case

Whilst a rigorous and in-depth analysis of an individual case is insightful, the strength of the studies for this thesis lies in the cross-case analysis. Although literal replication is unlikely, given the context-specific nature of the studies, it was hoped that theoretical replication of the 'generative mechanism' or guiding principles that underpin the formulation of CRSC strategy would be revealed. The cross-case analysis was therefore iterative in nature and developed as each case was completed. Easterby-Smith et al. (1991) suggest a 7-step process for analysing data based on a grounded theory; *familiarisation, reflection, conceptualisation, cataloguing concepts, recoding, linking and re-evaluation*. In line with the author's critical realist epistemology a more pragmatic solution was sought and the first three steps of this model were used to develop a number of key themes and frameworks against which the cross-case analysis was structured. The analysis was based on a review of the individual case technical analysis, and the structure and methods of the first level of analysis largely mirrored the structure and format of the individual case reports. This then provided the platform for a second level of explanatory analysis which sought to identify emerging themes across the cases. An excerpt from the cross-case analysis completed after the 4PLElectronicsCase is detailed in appendix 7.

3.3.5 Dissemination

An important aspect of case study research is dissemination. Whilst the reporting protocol provides the main backbone of the dissemination strategy for this thesis, it is not the full picture. In terms of disseminating results it was found more useful to consider the target audiences and the types of media most appropriate to their needs. The four key target audiences to which the results were disseminated were: the project team, the focal case study companies, wider academic audience and the wider practitioner audience. The forum/media used to disseminate to each of these audiences is summarised in table 3-15. Given the author's industrial background, the ability to disseminate the results to the practitioner community is a matter of some pride. In conjunction with her supervisor a 3-day executive development open programme was developed based on the emerging output from the doctoral studies. This programme ran for two years and was attended by over twenty different companies. This in turn led to a series of three customised supply chain strategy workshop for a multi-national consumer packaged goods company both in the UK and Eastern Europe.

	Project Team	Focal Firms	Wider Academia	Wider Practitioner
Forum / Media	• Quarterly reports • Quarterly project meetings • EPSRC annual reports	• Scoping study report & review meeting • Technical analysis report & review meeting	• Conference papers • Journal papers • Doctoral colloquium	• Industry forum (Cranfield Agile Supply Chain Research Club) • Executive education (open & customised programmes) • Practitioner papers

Table 3-15: Summary of the Forum/Media used to Disseminate the Output of the Studies

3.4 Ensuring the Rigour of the Research Design

Section 3.3 has given a detailed overview of the five-stage process (Flynn et al., 1990; Stuart et al., 2002/9; Yin, 1994) that was used to structure this methodology. By doing this, it is hoped that the rigour of the research design has been ensuredbut as a final check it was considered prudent to assess the research design against the four basic tests commonly used in empirical research. These are summarised in numerous text books (see Yin (1994) p33);

- *Construct validity*: establishing correct operational measures for the concepts being studied
- *Internal validity* (for explanatory or causal studies only): establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships
- *External validity*: establishing the domain to which a study's findings can be generalised
- *Reliability*: Demonstrating that the operations of a study – such as data collection procedures – can be repeated with the same results.

The COSMOS Corporation, cited in Yin, has developed a series of case study tactics that link to different phases in the research as illustrated in table 3-16. This model was used as a checklist to ensure that where appropriate the proposed tactics have been utilised as a way of maintaining the quality of the studies for this thesis. Specifically, the external validity of the studies should be improved by using a multiple case study design. This enables the use of replication logic to explore the 'generative mechanisms' that underpin the development of CRSC strategy across the three core cases. In terms of data collection, the author has endeavoured to use all three of the suggested techniques to improve construct validity. These include the use of multiple sources of data[38], establishing a clear chain of evidence[39] and having informants review key case study reports[40].

[38] Primary source is semi-structured interviews triangulated where possible with secondary archival and documentary sources.
[39] Six links in the COE for individual case analysis and a further two links for cross-case analysis
[40] The focal case study company reviewed the scoping study and technical analysis reports

Tests	Case Study Tactic	Employed for this PhD study	Phase of Research in which Tactic Occurs
Construct Validity	• Use of multiple sources of evidence • Establish chains of evidence • Have key informants review draft case study report	Y Y Y	Data collection
Internal Validity	• Do pattern-matching • Do explanation building • Do time series analysis	Y Y N	Data Analysis
External Validity	• Use replication logic in multiple case studies	Y	Research Design
Reliability	• Use case study protocol • Develop case study data base	Y Y	Data collection

After COSMOS Corporation cited in Yin (1994)

Table 3-16: Tactics for Ensuring the Quality of the Studies for this Thesis

In addition, the reliability of the data collection phase was improved through the use of a case study protocol and development of a case study database. In terms of communicating all aspects of the research design with the focal case study company, a project document was developed for each case study. This included the research parameters, case study protocol, the interview WBS and summary of the case study database. The format was common to all cases but the content was tailored to fit the research context. An example of a project document for the 4PLElectronicsCo case can be found in appendix 2. The project document was a living document that formed an informal contract between the focal company and research team, and as a result was subject to strict revision control.

Finally, in the analysis stage, internal validity is increased through the use of techniques such as content analysis and explanation building, and where possible models and frameworks were used to aid the process. However, it was not appropriate for the time series analysis to be used.

3.5 Chapter Summary

This chapter is arguably the most important chapter in this thesis as it seeks to provide the link between a series of gaps and concepts identified from the literature and turn them into a rigorous research design that has validity – internally, externally and through its constructs – and is also reliable.

The foundation to an effective research design is alignment between the research problem, the research design and, in an ideal world, the researcher's view of reality. In this respect studies for this thesis are on strong ground as this chapter has demonstrated the alignment between the author's Parmenidean-biased view of reality which has led to her support for the critical realist epistemology. This epistemology supports the trans-disciplinary mode-2 approach to management research that is favoured by the author and more particularly van Aken's view of management research as a design science. The exposure of generative mechanisms that describe 'why' reality – observed or unobserved – exists is at the heart of this paradigm. This is a good fit with the 'paired' research questions which seek firstly to describe 'what' the current state of CRSC strategy is and secondly 'why' it exists. A second set of research questions then seeks to probe more deeply and consider the opportunity for improved customer

responsiveness. The author has therefore followed the advice of van Aken, Yin and others who suggest that a multiple case study approach is the most effective means to 'probe deeply' into research questions of this kind. For pragmatic reasons in balancing the constraints of time, resources and access with the need to generalise results to theory the doctoral studies were based on three in-depth case studies and their cross-case comparison. In defining the research process for the multiple case study design a 5-stage approach was used – define parameters, instrument development, data gathering, data analysis and dissemination. By adopting this approach it was imperative to think very carefully about the decisions made in the research design and to adopt good practice where appropriate at each stage in the process. Examples of this include the use of a case study protocol, a strong and visible chain of evidence and verification of outputs with a wide range of audiences. Hence when the process was compared for research, to the four tests for empirical research, it appeared to be robust – demonstrating both validity and reliability.

The scene is therefore set to present the results of the individual case analysis in chapters 4, 5 and 6 before presenting the results of the cross-case comparison in chapter 7.

4 Pilot Case - CleanCo

4.1 Introduction

'Good ideas are not adopted automatically. They must be driven into practice with courageous patience'

Hyman Rickover (1900 - 1986)

The CleanCo case is a pilot in the sense that it was the first of the three cases and was an opportunity to develop and refine the methodology. It provided the opportunity to take the *'good ideas'* developed as part of the research design and to *'drive them into practice'*. The content and output of the pilot case are of the same rigour as the core cases but the process for data collection was broader. By using the research instruments in the CleanCo case it was possible to learn from applying them in practice, and so to become more efficient and effective in the core cases. The structure for the three case analyses is therefore common with one exception. This chapter for the pilot case includes an additional section (4.6) which details the methodological learning for the core cases presented in chapters 5 and 6. The chapter structure is designed to reflect the research design and to provide a link to the research questions. It reflects the advice of Pettigrew (1992) and begins with an overview of the context (section x.2)[41] from both the 'outer' business and 'inner' supply chain perspective. The next section (x.3), once again influenced by Pettigrew, presents the 'content and outputs'. It focuses on providing the data to address the research questions – CS1 and CS3 – which focus on the descriptive 'what' questions.

CS1. What approaches to customer segmentation and supply chain strategy formulation are currently adopted?
CS3. What is the relationship between current approaches to customer segmentation and supply chain strategy?

This is followed by a section (x.4) which explores the 'underlying mechanisms' that provide the data required to address research questions CS2 and CS4, the explanatory 'why' questions.

CS2. Why have these approaches been adopted?
CS4. Why has this relationship developed?

The 'potential for improved customer responsiveness' is then explored in section x.5 and addresses the final two research questions by considering the adoption of:

FP1. A customer focused approach to segmentation
FP2. A customer led approach to supply chain strategy formulation

Each case study is drawn to a close with a chapter summary. The application of this structure to the pilot case is summarised in figure 4-1.

[41] x is used to denote the relevant chapter (4 for pilot, 5 core case one and 6 core case two)

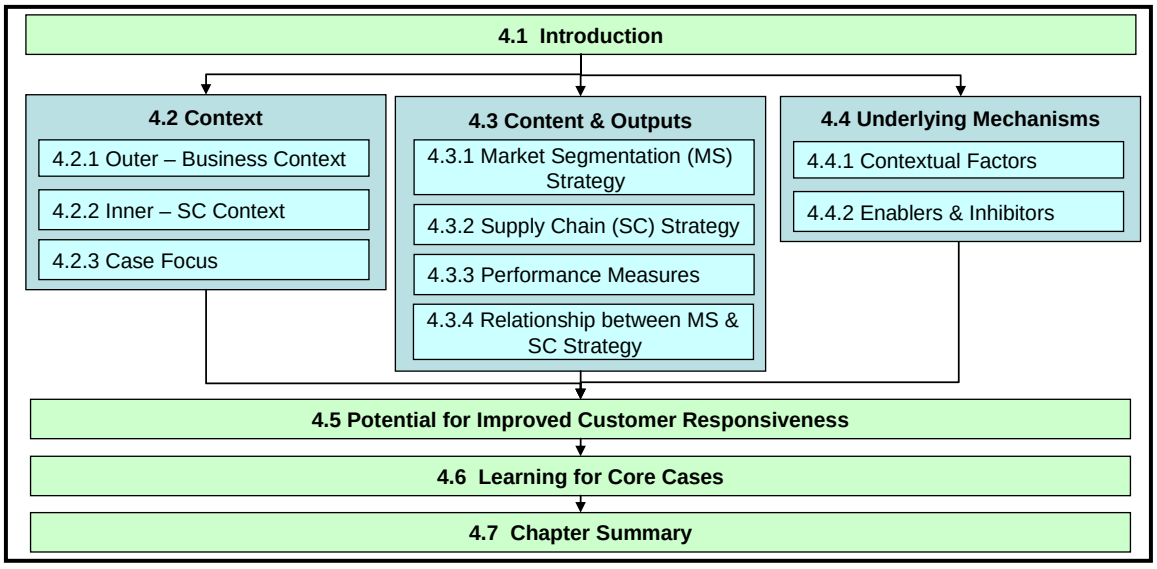


Figure 4-1: Structure for Chapter 4 (Pilot Case – CleanCo)

4.2 Context

These data were primarily gathered during the scoping study[42], the purpose of which is two-fold: firstly to present the contextual factors which may impact on the development of CRSC strategy[43] and secondly to identify the focus for the main study. It is presented in three main sections: 4.2.1. Outer − Business Context, 4.2.2 Inner − Supply Chain Context and 4.2.3 Case Focus.

4.2.1 Outer – Business Context

The business context for CleanCo has a number of elements. The first element is the positioning of CleanCo. This includes the positioning of CleanCo within its parent organisation CleanCo International (4.2.1.1), the background to CleanCo's UK operations and key business units (4.2.1.2) and an overview of the strategically important consumer business unit (4.2.1.3). It also provides details of the Business Integration (BI) project, a major business process re-engineering project underway within CleanCo (4.2.1.4) and presents the results of a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis (4.2.1.5).

4.2.1.1 CleanCo International (CCIL) – The Parent Company

CCIL is a publicly listed company with majority share ownership residing with the Smith family who occupy a number of key positions within the company. CCIL has fourteen companies which operate across three regions – Europe, Africa and Asia. Whilst there is a regional management structure a number of functions, including research and development (R&D), technical, information technology (IT), legal, finance, human resources (HR), and international marketing, are managed centrally. The majority of CCIL products and brands are country specific but since 1998 CCIL has been developing two international brands – brand X and brand Z.

[42] 2nd phase of fieldwork (as detailed in table 3-10)
[43] 3rd phase of fieldwork (as detailed in table 3-10)

4.2.1.2 CleanCo – Background

CleanCo is the UK operating company and is part of the European region. It has been operating in the UK for over one hundred years and employs 450 people across five locations – head office, two manufacturing sites and two warehousing facilities. CleanCo has three main businesses: contracts, inter-company and consumer as summarised in figure 4-2. The contract business accounted for 11% of CleanCo sales in 2000, the bulk of which is in the sale of soap based or 'noodles' to other UK soap finishers. CleanCo also produced finished soaps for other branded companies, and own label soap.

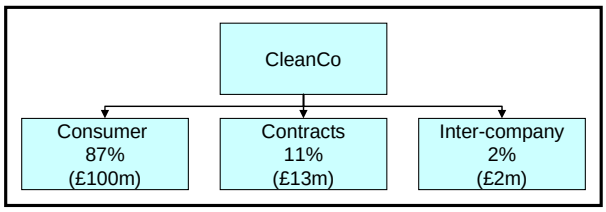


Figure 4-2: Main Businesses and % Sales (2000)

Trading with other operating companies accounts for 2% of CleanCo sales, but is often an area that is overlooked. Collectively, inter-company trading is equivalent to being CleanCo's eleventh largest customer.

By far the largest is the consumer business accounting for 87% of CleanCo sales. Given its strategic importance to CleanCo, this was selected as the business unit focus for the case study and will now be described in more detail.

4.2.1.3 Consumer Business Unit

4.2.1.3.1 Key Sectors & Categories

CleanCo operates in two main consumer sectors – 'washing & bathing' and 'household detergents'. As summarised in table 4-1, the household detergents sector accounted for 25% of CleanCo's consumer sales in 2000. The products are liquid based and include washing up liquid and carpet / upholstery cleaners sold as the UK brands, brand U and brand V.

Sector	Main Brands	Main Products	% Sales
Washing & Bathing	Brand X, Brand Z, Brand W	Bar soap, liquid soap, shower gel & moisturising body wash, bath liquids	75%
Household Detergents	Brand U, Brand V	Washing up liquid, carpet & upholstery cleaners	25%

Table 4-1: The Consumer Business – Sectors, Brands, Products and Sales (2000)

In contrast, the washing and bathing sales sector accounted for 75% of CleanCo's consumer sales in 2000. It had an estimated worth of £467 million / annum in 2001 and CleanCo was the second largest player with market a share of 16%. Despite its prominent position in the sector, CleanCo's sales were declining at 2% year on year whilst other players were enjoying double digit growth. This sector comprises four categories: bar soap, liquid soap, shower products and bath liquids. In 2001 the largest category and one still enjoying modest growth of 5.4% was shower products with

annual sales of £167 million. This included shower gels, moisturising body washes (MBW), foaming gels, and shower bars. The smallest category is liquid soap with sales of £52 million / annum and growth of +7.6%. CleanCo competed across all four categories with its two international brands. Brand Z was focused on the liquid soap category and Brand X across the remaining three. In terms of brand positioning Brand X was generally regarded as a mid-brand, representing products for everyday use by all the family.

Category	Annual Sales (£million)	Annual Growth (%)	CleanCo Brand Positioning		
			International		UK
			Brand X	Brand Z	Brand W
Bar soap	106	-8.8	Mid		
Liquid soap	52	+7.6		Premium	
Shower products	167	+5.4	Mid		Premium
Bath liquids	142	+1	Mid		
Overall	**467**	**+5.2**			

Table 4-2: Summary of the Washing & Bathing Sector (2001)[44]

Brand X has traditionally been a brand that appeals to the 'older' user. However, CleanCo have actively sought to modernise through re-branding and the introduction of new innovative products. Brand Z was a premium brand with a focus on liquid soap products. Given the growth of moisturising body washes in the UK, Brand W was introduced in the late 1990's in an attempt to move what was increasingly becoming a value for money (VFM) product up market. A summary of the washing and bathing sector and the positioning of the CleanCo brands is shown in table 4-2.

4.2.1.3.2 Channels

There are two main routes for consumer sales. There are 10 large accounts, which are known as National Accounts and which are managed by Business Development Managers. The remaining 200+ accounts are managed through the field sales structure, which is sub-divided into three groups: neighbourhood retail, discount and pharmacy. This structure is summarised in table 4-3.

National Accounts	Field Sales		
70% sales	30% Sales, 200+ accounts		
10 accounts	Neighbourhood Retail	Discount Sector	Pharmacy

Table 4-3: CleanCo Consumer Business Channel Structure

Historically the national accounts would keep the 'lion's share' of any margin improvement offered to them, and not pass it on to the customer. However, during the last five years there has been a divergence of strategies. Two main strategies have emerged. There is the 'VolCo model' of driving volume, through low pricing to drive efficiency and increase profits. In this model, margin improvement is passed on to the consumer. An alternative model is the 'ValCo model' of improving the margin to

[44] Source: Information Resources & Taylor Sofres – 07/10/01 – based on a 52 week rolling average

increase profit, more in line with the traditional approach. These differences in strategy provide a useful contrast to be considered in the fieldwork.

In 2000, total consumer sales were around £100 million of which £30 million were field sales. Over the last seven years, field sales have grown from 15-30% of consumer sales, fuelled by growth in the discount sector. This in turn is causing problems with the national accounts in that their Everyday Low Price (EDLP) pricing policies are applying pressure to lower prices further so that they can compete with the discount retail sector. This has had a knock-on effect on reducing brand image. The situation has been further exacerbated by 'grey market' sales, whereby national accounts purchase product at a reduced price through wholesalers either in the UK or overseas. This has the potential to further devalue the brand as it is common to 'sell-out' old stock through the wholesale channels which can get mixed with new stock if it is bought by the national accounts. CleanCo are trying to address this problem in two ways: firstly by increasing the price of product in the discount sector, and secondly by returning to a more traditional promotions strategy – avoiding promotions that drive volume through to the discount retailers.

4.2.1.4 Business Integration Programme

From 1995 to 2000 CleanCo gained considerable competitive advantage through the effective development and implementation of the principles of Efficient Consumer Response (ECR) with their customers. CleanCo's strength was through its strategy of customer intimacy[45] as illustrated in table 4-4. For instance, CleanCo was one of the first FMCG suppliers to offer its customers same day delivery using the principles of 'Quick Response'.[46]

	Business Focus		
Business Strategy	**Past -5 years**	**Present (2001)**	**Future +2-3 years**
Operational Excellence	20%	40%	10%
Product Leadership	30%	25%	50%
Customer Intimacy	50%	35%	40%

Table 4-4: The changing business focus at CleanCo as depicted by CleanCo's senior management team (2001)

The new millennium saw an increasing trend by the major retailers to be more focused on supplier development[47] activities. As a result, retailers started to identify suppliers for strategic development based on a range of factors such as amount of expenditure, product criticality, length of relationship, scope for improvement and process type (Cousins et al., 2008). CleanCo found that they were not priority candidates for supplier development. Their sales value, whilst significant for the washing and bathing sector, was relatively low across the toiletries category as a whole; their products had some brand collateral but were essentially commodities; and, their processes were good with only marginal scope for improvement. As a result, customers no longer wished to

[45] This is one of the three strategies proposed by Treacy & Wiersema (1993). The full three strategies are listed in table 4-4

[46] As described in section 2.3.2.3

[47] Supplier development can be defined as: *'any effort of a buying firm with a supplier to increase its performance and/or capabilities and meet the buying firms' short and/or long-term needs'* (Krause, 1999) cited in (Cousins et al., 2008)

invest time developing supply chain solutions with CleanCo – a major inhibitor to CleanCo's focus on customer driven supply chain projects. CleanCo could not change its strategy overnight and their three year goal was to develop 'brands' by pursuing a strategy of product development. They recognised that having branded products that were critical to their customers would increase their strategic importance as a supplier and hopefully once again open the door for supplier development activities. The project to develop and implement this change in strategy was called the Business Integration (BI) process.

4.2.1.5 CleanCo – SWOT Analysis

A Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis was conducted during the scoping study and input was received from nine senior managers. A summary of the SWOT analysis is illustrated in table 4-5 with a full version included in appendix 8. The main threats facing CleanCo were environmental. These included concerns over packaging legislation, export limitations on products using UK sourced tallow and concerns about the rapidly declining market for bar soap. There were two key weaknesses that were seen as potential opportunities for CleanCo (highlighted in green in table 4-5). The first was New Product Development. This had historically been seen as an incremental process that introduced brand extensions rather than radically new products. The developing opportunity was to introduce more innovative new products and to leverage the technology expertise of the supplier base and flexibility of contract manufacture to do this. A conservative and risk averse culture was also seen as a weakness with the opportunity to become more open and honest. By far the largest number of factors was seen as both strengths and weaknesses and the resulting opportunity was to find a balance between the two extreme positions (highlighted in red). For instance, brand heritage was seen to be a strength but the flip-side – aging brands – a weakness. The opportunity was to develop the brand portfolio which included brand extensions, upgrades and franchises. Longevity of service was perceived by some managers as a strength whilst others believed it to be a weakness. There was consensus that the opportunity was to balance 'old' and 'new' staff to build on the heritage whilst injecting new ideas. In a similar vein whilst there was perceived to be some strength in terms of localised processes, the weakness was that they were neither integrated nor holistic. The business integration project was seen as an opportunity to create holistic end to end processes. CleanCo also understood that the last five years had seen a significant change in their positioning as a supplier to the top ten UK retail accounts. In the past their size had not been an issue and CleanCo had used process innovation as a way of building relationships with large retailers. This was no longer possible as CleanCo were not regarded as a strategic supplier. The opportunity was therefore how to become a strategic account. Promotions strategy (highlighted in blue) was seen as both a strength in terms of offering but a weakness in terms of revenue generation. Unlike the other factors no solution was offered in terms of an opportunity.

Strengths	Weaknesses
• Good brand heritage • Established company • Strong financial performance – last financial year • Promotional Strategy – total package • Processes – sound infrastructure (but not joined up) • People – longevity of service • Customer relations – customer intimacy • Communication • Flexibility – size, family ownership	• Ageing brands • People – longevity of service • Culture – too conservative / risk averse • New Product Development – incremental • Size – regional not global business • Poor infrastructure & processes • Promotional strategy – not generating enough sales • Customer intimacy – don't fully understand Tesco, Asda • Politics – CC & CCIL • Historically weak financial performance
Opportunities	**Threats**
• Brand development • New Product Development • Size – leverage flexibility • People – balance old and new • Financial – reduce cost base • Customer Relations – become a strategic account • Supplier relations – utilise technology to enable NPD • Culture – more open and honest • Business Integration Process • Use of contract manufacturing	• Environmental • Loss of competitive position in UK due to size • Multiple pricing issues • Grey markets • Globalisation – scale & scope

Table 4-5: Summarised SWOT Analysis

4.2.2 Inner – Supply Chain Context

The CleanCo supply chain has two main manufacturing sites in the UK; Factory 1 is situated in the Midlands and produces a range of bar soap and aerosol products. Factory 2 is located in the North of England and produces shower gel, bath oil and other liquid products. CleanCo produces around 240 Stock Keeping Units (SKUs) based on approximately 80 product families. These figures vary by +/-10% depending on the level of promotional activity. CleanCo also use contract or 3rd party manufacturers to help them cope with peaks in demand and the introduction of new products for which they do not have the technical expertise. CleanCo own and operate two finished goods (FG) warehouses which are located in the north of England. All FG stocks are transferred to these warehouses and stored in anticipation of customer demand. Again, CleanCo use 3rd party warehousing facilities to deal with peak demand. The target level of FG stock across the network is in the order of £5.5 million. CleanCo outsource all logistics activities to a 3rd party, HaulierCo, who are responsible for all FG movements between factories and warehouses and to customers' warehouses. All but three of CleanCo's 210 customers have their deliveries co-ordinated by HaulierCo. Depending on the customer's own distribution network, HaulierCo may make deliveries direct to store, to one central warehouse or to a number of regional warehouses.

CleanCo has approximately 150 suppliers who provide a range of component goods (CG) to the manufacturing sites. These range from bulk products such as fats and oils procured through brokers to PET[48] bottles, bulk chemicals, fragrances, corrugated packaging and closures. All CG are stored at the relevant manufacturing site and it is the responsibility of the suppliers to organise delivery. The top level dimensions of the CleanCo supply chain are summarised in table 4-6.

[48] PET = Polyethylene Terephthalate

Source	Make	Deliver	
Suppliers	***Stock Keeping Units***	***Carriers***	***Customers***
Approx 150 Fats & Oils – 6 brokers Raw materials – 135 Labels – 2 Bottles – 2 Closures – varies Corrugated - 1	Approx. 80 generics or families 240 SKUs No. of SKUs vary by level of promotional activity	1 main carrier HaulierCo *Exceptions:* Customer A – send in Securicor Customer B – collect (backhaul) Customer C – collect	Over 210 customers *National accounts* 10 accounts (70% value) *Field sales* Over 200 accounts (30% value)

Table 4-6: CleanCo Supply Chain – Top Level Dimensions

Parts of the infrastructure underpinning the CleanCo supply chain are over 100 years old and in need of investment. This is particularly true of the Northern based manufacturing and warehousing facilities where processes have been developed to fit into existing buildings which are not purpose built and sub-optimal.

4.2.3 Case Focus

As explained in chapter three, given the complex nature of supply chain management, one of the purposes of the initial scoping study was to provide a focus for the more detailed case study exploration. The focus for the CleanCo study was on the strategically important washing and bathing sector within the consumer business unit. This sector accounted for 65% of CleanCo's total sales in 2000 and was seen as the main area for future growth. Given that CleanCo was pursuing a strategy of product innovation, two products were selected that represented polar extremes of innovation. Bar soap was selected as a commodity product and aerosols as the driver of innovation within the CleanCo portfolio. Both products were produced at Factory 1 and included variants marketed as the international brand, Brand Y.

As mentioned previously in section 2.2.1, these studies are designed to look beyond the dyad and focus on the four core supply chain processes (Plan-Source-Make-Deliver) from the 'customer to supplier' of the focal firm – in this case CleanCo. Following through the concept of 'polar extremes', customers and suppliers were carefully selected to meet two criteria:

1. Link into the business / sector / product focus previously identified
2. Represent strategic extremes at their stage in the supply chain

From a customer perspective, this decision was based on customer strategy, and customers were selected that – from a retail perspective – represented the extremes of a volume driven strategy ('VolCo') and a value driven strategy ('ValCo') within the CleanCo national account structure. Both VolCo and ValCo had distribution networks that supplied their 'northern' and 'southern' stores via two regional distribution centres (RDCs) as illustrated in figure 4-3. HaulierCo was able to service the VolCo and ValCo RDCs via two consolidation hubs and in the case of ValCo through an additional stage in the logistics network – a Quick Response warehouse. This was required to enable same day delivery for ValCo orders. This was not a requirement for VolCo orders and hence they were not routed in this way.

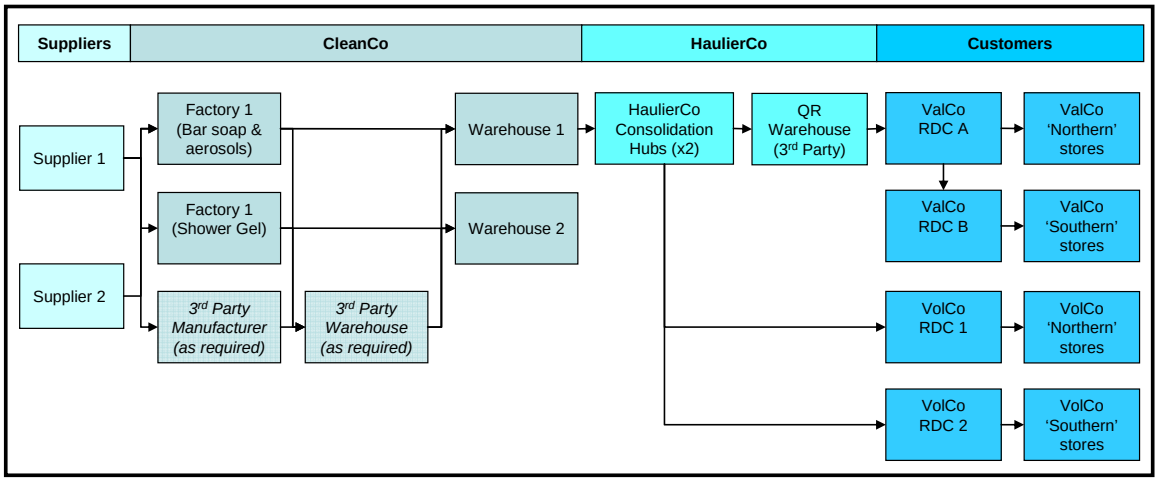


Figure 4-3: Overview of CleanCo Supply Chain reflecting the Research Focus

From a supplier perspective two suppliers were selected that represented extremes in the types of products that they supplied to CleanCo. Supplier 1 provided outer packaging for the full range of CleanCo products. These products were high in volume, low in variety and complexity, and hence considered to be 'commodity'. In contrast, Supplier 2 provided a range of closures for the aerosol products which were considered to be driving innovation in the CleanCo shower products range and hence in comparison were considered 'innovative'.

The purpose of the research focus was to enable questions to be focused at both a specific level as well as a more general level in an attempt to understand what factors drove the decision making process at different stages in the supply chain. The focus for the CleanCo case is summarised in table 4-7 below.

Parameter	Focus for CleanCo Case
Operating Business	CleanCo
Business	Consumer
Catgory	Toiletries
Sector	Washing & Bathing
Product	Commodity product (bar soap) Innovative product (aerosol)
Channels (Customers)	1 national account with volume driven strategy – VolCo 1 national account with margin driven strategy – ValCo
Suppliers	Supplier 1 ('commodity' packaging) Supplier 2 ('innovative' closures)

Table 4-7: Summarising the Focus for the CleanCo Case

4.3 Content and Outputs

This section focuses on providing the response to research questions CS1 and CS3 which focus on the descriptive 'what' questions. Section 4.3.1 focuses on understanding what drives CleanCo's market segmentation strategy and section 4.3.2 its supply chain strategy. This is explored at a holistic level and also within the individual core supply chain processes (Plan, Source, Make and Deliver).

4.3.1 Market Segmentation (MS) Strategy

At the heart of market segmentation in CleanCo was the grading of customers. To quote the customer quality manager:

'We are looking towards grading customers, but it's an emotive subject. It's really about making allowances for transport and infrastructure.' (BB #2)

This was a view shared by the Logistics Controller who believed that CleanCo needed to decide:

'Which needs of which customers do we wish to meet...we can't be all things to all men. We need to be choosy in terms of customers, products etc.' (PB #5)

A key driver for this has been the consideration about what to do with small customers, and CleanCo made a decision in early 2001 to increase the minimum order quantity (MOQ) from fifty to one hundred cases. The logistics controller was:

'Sure that the needs of small customers could be met more effectively through other mechanisms.' (PB #5)

In other words, it was better for both the customer and CleanCo if 'small' customers did not deal directly with CleanCo but received their products through an intermediary. This links back to the channel strategy presented in table 4-3 and is a strategy for addressing the long tail of over 200 field sales accounts. In fact, on first inspection, channel strategy appears to be the primary criterion for segmentation within CleanCo. However, the ten national accounts are also the largest by account value so it could be argued that the first criterion is actually account value. This argument is reinforced when in practice the top three field sales accounts by value are managed in the same way as the national accounts. Given the large number of field sales customers a secondary form of segmentation – channel segmentation – is applied, dependent on retail outlet type: neighbourhood retail (e.g. Londis), discount (e.g. Pound Stretcher) and pharmacy (e.g. Lloyds the Chemists). Hence the primary means of segmentation for CleanCo is account value and the secondary means is retail type as illustrated in table 4-8 below.

Bases of Segmentation			
Primary		**Secondary**	
Bases	**Example**	**Bases**	**Example**
Account Value	Top 13 accounts by account value	Retail type	Neighbourhood retail, discount, pharmacy

Table 4-8: Primary and secondary bases of segmentation in CleanCo (2001)

From a sales and marketing perspective, the approach to segmentation drove the customer account management process. The top 13 accounts were perceived to be of strategic importance to CleanCo – predominantly due to their sales value – and as a result were managed using the principles of key account management (KAM)[49]. The remaining accounts had account managers assigned firstly on retail type and then geography. For the key accounts there was a ratio of 2-3 customers per account

[49] KAM is the management of the customer relationships that are most important to a company. Key accounts are those held by customers who produce most profit for a company or have the potential to do so. (source: www.bnet.com/definition)

manager whilst the field based account managers could be dealing with up to 30 customers. The greater focus of the key account managers enabled them to determine the needs of each individual customer, and implement procedures to ensure that they received premium customer service to maximise customer satisfaction. Hence hypothesis HCS1:

'Customers are segmented based on buying behaviour driven by an understanding of customer value'

…must be rejected as this was not the method of segmentation used by CleanCo.

4.3.2 Supply Chain (SC) Strategy

Segmentation is not a word that is widely used beyond marketing theory though it manifests itself throughout the supply chain. At a grass roots level, it is the factors that drive differentiation in the supply chain at both a holistic and process level. It is essentially the means by which managers across the supply chain seek to organise and develop their resources. This section begins by looking at the way in which CleanCo's management decisions drive differentiation in each of the core supply chain processes before considering their overarching supply chain strategy. The section is organised on the SCOR core processes 'plan-source-make-deliver' described in Section 3.3.1.3.

4.3.2.1 Plan

All CleanCo products are produced to forecast and production planning at CleanCo is co-ordinated by the Logistics Planning Manager:

'Generally everything is planned in the same fashion' (ML#13)

The twelve production lines at factory 1 and seven lines at factory 2 are all planned centrally on an alternating bi-weekly basis. The planning schedule has a twelve week planning horizon with the first two weeks 'frozen'[50], a 'slush'[51] period of a further six weeks and a 'liquid'[52] period for a further four weeks. Production is initially planned at a product family or 'generic' level and then specific SKUs are sequenced within their product family. CleanCo are typically planned for 80 generics and 240 SKUs across the two factories in weekly buckets. The planning characteristics for CleanCo production planning are summarised in table 4-9 below and a process flow for the planning process is detailed in appendix 9.

Characteristic	Application to CleanCo
Planning unit	Product families / Generics – 80 Stock Keeping Units (SKUs) – 240
Horizon	12 weeks
Time fences	Frozen – 2 weeks Slush – 6 weeks Fluid – 4 weeks
Frequency of review	Bi-weekly
Buckets	Weekly

Table 4-9: Summary of the CleanCo production planning characteristics

[50] Frozen period: No changes can be made to the plan without incurring high cost
[51] Slush period: Changes need to be confirmed before they can be made to the plan
[52] Liquid period: Changes can be made to the plan as needed

Whilst generally everything is planned in the same way at CleanCo, there are two specific drivers of difference. A minor difference is between the planning of in-house and third party production. CleanCo's default position is to favour in-house production but where technological expertise or production capacity is not available internally then CleanCo will sub-contract. CleanCo find that third parties are less questioning of their planning practices than internal stakeholders and can therefore issue plans for a twelve week planning horizon, with four weeks frozen, four weeks fluid and four weeks liquid. Apart from the change in frozen and fluid periods all other parameters remain the same.

A more significant difference occurs in the planning of promotions. The majority of promotions that CleanCo run require promotion specific packaging. This in turn means that specific SKUs are developed for promotional purposes. The promotions tend to be for specific customers (usually the top thirteen accounts) and run for between 4 and 8 weeks. Stock for promotions tends to be planned in campaigns[53] as it is commonplace for the customer to take 60-80% of the volume in a short period of time before the promotion begins. Promotions therefore require very careful planning as:

1. They represent a significant disruption to steady state planning
2. They usually require the procurement of promotion-specific components that are not used for steady state production and the lead times need to be taken into account
3. The ramifications of failing to provide promotional stock to key customers are more severe than for steady state

Hence, whilst it may not be overtly recognised by the planning team, a key driver of difference in the planning process at CleanCo is the difference in the planning of 'steady state' production versus 'promotions'.

It is also worth noting that as part of the Business Integration project, CleanCo were in the process of introducing a formalised Sales & Operations Planning (S&OP) process which was sponsored by the managing director. This looked at balancing demand and supply (at the product family level) over a rolling 3-24 month time horizon with the objective of closing the gap between company strategy and reality.

4.3.2.2 Source

The view of the senior purchasing executive was that CleanCo:

'Needed a general sourcing strategy to set the direction, but then deal with everything on a case by case basis' (GCh #4)

The purchasing function was in a state of change at the time that the case study took place. The senior purchasing executive had only been in position for three months and was in the process of redefining CleanCo's sourcing strategy. The starting point was to split the supply base into a number of categories – 3rd party contracts, rigid packaging, raw materials and flexible packaging – and then to identify the product families and specific products within each category. Responsibility for specific category/product combinations was then assigned to individual members of the team as illustrated in table

[53] As a specific set of activities designed to meet the objectives of a particular promotion

4-10. The type of contract and order type varied by category/product mix. The type of contract has evolved over time in an attempt to find the best approach for a given purchasing context.

Purchasing Team Member	Category	Product Family	Product Types	No. Suppliers	Contract	Order
Purchasing Executive	3rd party contracts	N/A	Manufacturing and warehousing capacity	Manufacturing – approx 3 Warehousing – approx 3	Currently 'free issue' contracts looking at moving to 'total issue' contracts	N/A
Purchasing Manager	Rigid packaging	Bottles	HDPE & PET bottles	2	Tender for all new business. Contracts tend to last for the life of the tooling.	Schedules
		Closures	Screw caps, pumps, flip top lids, non-drip	1 supplier flip top lids/screw caps 2 pump suppliers	Tender for all new business. Contracts tend to last for the life of the tooling.	Schedules
		Corrugated cardboard	Outers	1	4 year supply agreement (made some CapEx)	Schedules
Purchasing Manager	Raw Materials	Fats & Oils	Palm oil, tallow	8 brokers for tallow (2 in US, 6 in UK) 1 broker for palm oil	Special contracts	Open discrete orders. Site calls off from tank farm in Liverpool
		Caustic	Caustic	1	*Not specified*	Blanket order Telemetry
		HCl	HCl	*Not specified*	*Not specified*	Blanket order – site does call off
		Surfacants	SLES, Sulphonic acid	1 (only 2 major players in UK)	*Not specified*	Blanket order Telemetry
		Perfumes	Fragrances	1	Purchase where possible from Fragrance Chemicals (part of group)	*Not specified*
Buyer 1	Flexible Packaging	Labels	Labels	2	*Not specified*	Schedules
		Films	Hard & soft wrap	*Not specified*	*Not specified*	*Not specified*
	Utilities	Utilities	*Not specified*	*Not specified*	*Not specified*	*Not specified*
Buyer 2	Raw materials		'Tip ins'	Approx. 100	Cyclical tendering (every 4 months) through reverse auctions through distributors for low value items (> £15k)	Schedules

Table 4-10: Summary of CleanCo purchasing categorisation

The Kraljic matrix (1983) cited in Cousins et al. (2008) is a common tool used to help purchasing professionals make supply management decisions. At its simplest level it considers the impact on the business (internal issues) vs. supply risk (external issues) to enable the company to (1983) p110:

'Determine the type of supply strategy the company needs both to exploit its purchasing power vis-à-vis important suppliers and to reduce its risks to an acceptable minimum'

Further details of the Kraljic matrix can be found in appendix 10. Whilst this approach was not used overtly within CleanCo, covertly it had shaped the CleanCo supply management strategy and it is possible to plot the sourcing strategy for the key categories as illustrated in table 4-11. Whilst most of the CleanCo categories fall neatly within this categorisation, there are three products for which the boundaries were more blurred. The first is fats and oils. Although these were purchased competitively through eight different brokers, one of the ways in which advantage could be leveraged was through future trading. These items could also become critical items in the event of a world shortage. The second was tooling. The majority of CleanCo products have a specific bottle shape and hence require their own specific tooling. The relationship with the supplier at the tooling development stage can be critical – particularly if a new product launch is dependent on it – though once the tool is up and running the actual production of bottles requires more of a leverage strategy. The third fuzzy area is also related to innovation. The majority of rigid packaging is for standard products and hence requires a leverage strategy. However, rigid packaging is also a key route for driving product innovation. Therefore innovative rigid packaging becomes a critical item.

	Non-critical or Routine	**Leverage**	**Bottleneck**	**Strategic or Critical**
Impact on business	*Low*	*High*	*Low*	*High*
Supply Risk	*Low*	*Low*	*High*	*High*
CleanCo Categories	'Raw materials': Tip-ins Flexible packaging Utilities	All other 'Raw materials' Standardised rigid packaging	3rd party manufacturing	Innovative rigid packaging Tooling

Table 4-11: Positioning of CleanCo purchasing categories on the Kraljic matrix

As advocated by Kraljic, CleanCo utilises more junior members of staff (buyers) to deal with the routine items – commodity items in CleanCo parlance – and they focus on making the purchasing process as efficient as possible. This is achieved through a 4 month cyclical tendering process using reverse auctions. Pricing is very competitive and relationship with suppliers very transactional. Surfactants are a good example of a 'tip-in' raw material that CleanCo source in this way, as illustrated in table 4-12.

CleanCo terminology	**Commodity**	**CleanCo Specific**	**Innovative**
Kraljic/Cousins et al. equivalent	***Routine: Efficiency***	***Leverage: Best deal***	***Critical: Co-operation***
CleanCo example	Surfactants	Bottles	Aerosol pump
Power balance	CleanCo	CleanCo	Supplier
Technology	Low tech	CleanCo specific tooling or software (but can be moved)	High tech. Patent protected.
No suppliers	1	2	1
No potential suppliers	2 (but 2 years previously was 10)	Numerous	1
Negotiation process	4 monthly tender	Annual contracts, though tend to be for lifetime of tooling	Developed to suit the purchasing context
Type of relationship	Transactional	Relational (CleanCo has the upper hand)	Relational (Supplier has the upper hand)
Strategy	Reduce time for dealing with transactions	Reduce cost. Work with existing suppliers and look for new suppliers, potentially with Group purchasing synergy.	Reduce cost. Look at alternative mechanisms or products that could be used.
Effect on price	Very competitive	Competitive	Less competitive

Table 4-12: Example of the application of Kraljic thinking to specific CleanCo products

The majority of items within the CleanCo require a 'leverage' purchasing strategy. These items typically have one or two preferred suppliers with whom CleanCo have a good working relationship. PET bottles are a good example of such a product. CleanCo begin to develop the relationship during the tooling development stage and have found that they can leverage their purchasing power most effectively if they remain with the same supplier for the lifecycle of the tool. CleanCo remain vigilant of potential opportunities with other bottle manufacturers as this is a competitive market. They are particularly interested in developing relationships with global bottle manufacturers with whom they could leverage the group (CCIL) purchasing power.

The procurement of critical items is one area of their portfolio where CleanCo believe they have less 'power' than their suppliers. The success of a new product can be dependent on the patented technology of just one or two suppliers. CleanCo are trying to reduce their dependency on such suppliers by finding alternative technologies but this is not always possible. As CleanCo pursue their strategy of product innovation this will become an increasing challenge for the purchasing function.

In summary, the primary driver of differentiation with the CleanCo purchasing strategy is product category. This in turn aligns with the commonly adopted Kraljic approach to supply strategy, with two emergent secondary drivers. The first is the impact of commodity trading. Key to the successful leveraging of such products is the ability to trade on the commodity market. This is a different skill from those required for many other leverage items. There is also a risk of global scarcity which could turn such items into critical items which then changes the mode of operation from one based on transactions to that of relationships. The other secondary driver is innovation. CleanCo are pursuing a strategy of product innovation which increasingly requires the development of specialised rigid packaging – particularly closures – with patented design and limited supply routes. CleanCo therefore have items within rigid packaging that require different supply strategies. Hence we return full circle to the wise words of the purchasing executive who in line with the mode-2 approach suggested that whilst the purchasing framework sets direction, decisions need to be made based on the purchasing context of individual items.

4.3.2.3 Make

Within the process the primary decision is to allocate the product to an internal manufacturing site and this is done by product type e.g.:

Factory 1. Bar soaps and aerosols
Factory 2. Liquids

A secondary decision is then whether to produce the product internally on the designated site or externally using a 3rd party manufacturer. There are two main reasons why CleanCo outsource manufacture: firstly to trial new technologies and secondly to provide additional capacity during peak periods. These product routing decisions are made by the planning department based on manufacturing process capability. Processes and their associated production lines have been developed to accommodate particular products and are not interchangeable, e.g. aerosol cannot be produced on a bar soap line. In addition to specificity of manufacturing equipment there are some important differences between the bar soap and aerosol manufacturing processes.

CleanCo have the most advanced bar soap facility in Europe which was installed in the 1980's. The production of bar soap is a two-stage process. The first stage is a continuous flow process which produces soap base or 'noodles'. Contract sales accounted for 11% of CleanCo sales in 2000 and the bulk of this was the sale of soap base to other finishers. The level of complexity is low and CleanCo only produce four variants of noodles to meet both internal and contract sales requirements. CleanCo produces approximately 500 tonnes of soap base per week on a make to stock (MTS) basis. The plant has a capacity in excess of 800 tonnes per week but there is insufficient demand to operate at this level. Rather than run the plant continuously at reduced output, CleanCo found it more productive to run the plant at full capacity for 5 days and then shut down for 2 days – essentially a 'big batch' operation. It is possible to store soap base. Depending on the manufacturing line for which soap base is intended, it is stored either in bulk, 1 tonne or 25kg bags. Contract soap base has its own separate bulk storage. Details of CleanCo's soap base, soap finishing and aerosol processes are detailed in appendix 11. Key attributes are summarised in table 4-13.

	Soap Base - Noodles	**Bar Soap**	**Aerosol**
Process	'Big Batch' i.e. one back from continuous flow	Larger batches than Aerosols	Smaller batches than bar soap
Asset Utilisation	5 days on 2 off	5 days on 2 off	Alternates with antiperspirant
No. Variants	4	More than 50	Less than 20
Volume	500 tonnes/week	75,000 bars/week	10,000 bottles/week
MTS/MTO	MTS	MTS	MTS

Table 4-13: Key attributes of the soap base, bar soap and aerosol manufacturing processes

It is at the soap finishing stage that complexity is added to the process and the four basic variants of soap noodles are transformed into over 50 different bar soap SKUs. The finishing stage involves the addition of moisturisers, colours and fragrances before the bars of soap are stamped, packed and wrapped. Once again it is an MTS process. The production pattern mirrors that of the soap base though the secondary stage is effectively decoupled from the primary stage through the bulk storage of noodles. The soap finishing process has many parallels with the aerosol production process which is essentially a mixing, bottle filling, capping and packing activity although the complexity is substantially less. The volume of aerosols is more than 80% smaller than for bar soap, and it has 60% less variants. It is also an MTS operation. Within the manufacturing process there was a view that:

'You shouldn't treat aerosols the same as bar soap' (PM#15)

The rationale was that − for the more innovative aerosol products − the manufacturing priority should be on product quality, and hence batch size (and hence efficiency) may reduce as a result. In contrast the commodity bar soap products should focus on cost and relax quality standards accordingly. One shared issue of both bar soap and aerosol production is their ability to deal with promotions. As mentioned previously, most promotions result in the creation of new SKUs with customised rigid packing requirements. These orders are still driven by the same forecast driven planning process and are essentially MTS in large campaigns which are disruptive to steady state production. Figure 4-4 summarises the positioning of the core CleanCo manufacturing processes for base soap, finished soap and aerosols on a volume: variety matrix (Slack et al., 1998).

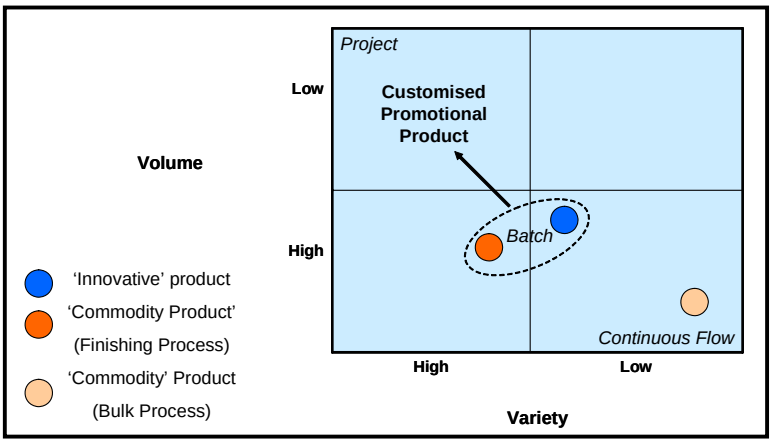


Figure 4-4: Manufacturing product: process[54] at CleanCo

Soap base is a relatively high volume, low variety product and sits on the project continuous flow diagonal just above continuous flow to reflect its 'big batch' approach. The bar soap finishing process and aerosol production occupy the mid-space of batch production, which reflects their manufacturing process. However, the production of relatively small campaigns of promotional product is more akin to a 'jobbing'[55] type of activity, though it is currently dealt with in exactly the same way as steady state production. Hence in a similar vein to the planning process the opportunity exists to differentiate production regardless of manufacturing process on a 'steady state' vs. 'promotions' basis.

4.3.2.4 Deliver

The scope of the 'deliver' process was from order receipt to delivery at the final point in the customer distribution network. For VolCo and ValCo this was their store network. CleanCo essentially had two types of sales order: 'quick response' sales orders which were received, picked and delivered on the same day, and 'standard orders' which were typically received day 1, picked day 2 and delivered on day 3[56]. CleanCo offered the quick response service to its 13 key accounts but only ValCo utilised the service. All other customers (including VolCo) preferred to stick with the standard delivery pattern as this was consistent with other suppliers and hence could be dealt with using their standard processes. The timings for fulfilling the two different sales order types are summarised in table 4-14.

Stage in sales order fulfilment process	Sales Order Type	
	Quick response	Standard
	ValCo	*VolCo*
Receipt	8am – Day 1	Day 1
Pick	10am – Day 1	Day 2
Deliver	4-5pm - Day 1	Day 3

Table 4-14: Summary of the VolCo and ValCo order fulfilment process timings

[54] Introduced in section 1.2.2.2 and figure 1-4

[55] Jobbing – deals with high variety and relatively low volumes. The resources of the operation will process a series of products but, although the products will require the same kind of attention, each will differ in its exact needs. (Slack et al., 1998) p124

[56] This was the minimum lead time for standard orders, and flexed to any number of days above 3 to meet customer specific lead time requirements

Whilst ValCo was the only customer to use quick response sales orders, it was very pleased with the results. As illustrated in table 4-15, quick response had reduced the lead time for CleanCo product from 6 days to 5-6 hours and gave them the ability to place an order for a single case. The net benefits, cited by ValCo, were a reduction in stock cover from 2.2 to 0.7 weeks, a reduction in 'cases to follow'[57] from 134 to 30 and an increase in product availability in RDC from 91% to 99%.

ValCo Criteria	Before QR	After QR
Lead time	6 days	5-6 hours
Order quantity (cases)	2400	1
Stock cover (weeks)	2.2	0.7
Cases to follow (number)	134	30
Availability (%)	91%	99%

Table 4-15: Benefits of QR as cited by ValCo

Despite these impressive results, VolCo and the other key accounts preferred the benefits of process standardisation, i.e. the ability to process and receive CleanCo orders in the same manner as for all other ambient suppliers, rather than to accept the benefits of reduced inventory and improved availability. From a CleanCo perspective the benefits of quick response were less tangible. In order to ensure that goods picked by 10am were received by 4-5pm, HaulierCo held stock for CleanCo in a quick response warehouse located in the Midlands. This warehouse held SKUs that were specific to the CleanCo account though in emergencies was used to fulfil orders for other national accounts. The additional operating and inventory holding costs were borne by CleanCo and not passed on to ValCo. As illustrated in figure 4-3, stock flowed from the quick response warehouse to the ValCo RDC 'A' from which it was routed directly to the southern store network or onto RDC 'B' for distribution to the northern store network. This contrasts with VolCo orders which had a more direct route to store, passing from the main CleanCo warehouse directly to RDC 1 – to supply the southern stores – and to RDC 2 – to supply the north. Neither VolCo nor ValCo replenished their stores with CleanCo products on a daily basis, they received deliveries 2-3 times/week. In both cases, the range of CleanCo products held at a store level varied depending on store size and the demographics of the store's catchment area.

In addition to the QR warehouse owned and operated by HaulierCo, CleanCo had two main warehouses which were approximately of the same size. Historically stock had been distributed between the warehouses based on order size, hence warehouse 1 dealt with all large orders and warehouse 2 with the smaller orders. This meant that orders for the same customer could be fulfilled from two different warehouses. Stock was 'pushed' into the warehouses at the behest of the factories and if capacity were not available it was re-routed to 3rd party facilities. The warehousing processes were quite inefficient and identified by the business integration as a priority for improvement, particularly in terms of inventory reduction. Appendix 12 provides a detailed description of the allocation, weigh bill number assignment, and pick and despatch processes. Improvements commenced in February 2002. The starting point was changing the basis of warehouse differentiation from order size to customer accounts. All export orders were routed through warehouse 2, and then the remaining customer accounts fairly arbitrarily so that they would be fulfilled from just one warehouse. To

[57] 'Cases to follow' is a measure of back orders. 30 'cases to follow' means that there is an outstanding requirement for 30 cases of product which is unfulfilled.

support this change and improve information flow, the customer services team members moved from head office to the warehouse from which their customer orders were fulfilled. The longer term vision was for steady state stock to be replenished from factory to maintain a pre-determined stock level and for promotional stock to be cross-docked directly to the customer.

CleanCo have two sets of inter-dependent decisions which affect the 'deliver' process. The first is the lead time that they offer their customers. CleanCo offered their customers the choice between a same day or 3 day+ delivery option. In terms of infrastructure whilst all same day delivery stock was routed through a quick response warehouse the situation was more confused for standard delivery. Orders were allocated and despatched from warehouse 1 or 2 based on order size and it was common for orders for the same customer to be despatched from both warehouses. This was changed in February 2002 to ensure ownership of customer accounts by a specified warehouse to maintain/improve customer service whilst reducing inventory.

4.3.2.5 Overarching strategy

As demonstrated in sections 4.3.2.1 – 4.3.2.4 and summarised in table 4-16, CleanCo did not have an overarching manufacturing strategy but a series of functional strategies developed in relative isolation with no obvious connection between them.

Core Process		Current explicit drivers of differentiation	
		Primary	Secondary
Plan		None	None
Source		Category (loosely aligned to Kraljic)	Item specific requirements
Make		Product type (liquid, soap, aerosol)	Make or Buy
Deliver	Sales orders	Lead time (1 day or 3 day)	None
	CleanCo warehouses – historic	Order size (large or small)	None
	CleanCo warehouses – new	Export order	Customer account
	HaulierCo QR warehouse	QR orders only	None
	Customer RDCs	Product type (ambient)	Geography (north vs. south)
	Customer stores	Store size	Catchment area demographics

Table 4-16: Explicit drivers of differentiation within the core supply chain processes at CleanCo

The planning process was essentially the same regardless of product, customer or buying behaviour. Supply strategy was developed based on product categories (e.g. rigid packaging, flexible packaging, 3rd party contracts etc.) that were loosely related to the Kraljic matrix. It was also recognised that whilst this set the general direction, supply strategy needed to be determined at an item by item level. Decisions regarding manufacturing strategy focused on product type and allocation of products to the appropriate production line. Given the scope of the 'deliver' process there was more granularity to key strategic decisions, but even with the deliver function there was a lack of connectivity. The one exception was the process for same day deliveries. The order type, use of a quick response staging warehouse and flow of materials through the customer distribution network was seamless and a testament to what CleanCo could achieve with focus. Unfortunately this did not exist for standard orders where the historic allocation of orders to warehouses based on order size resulted in the same customers receiving stock from different warehouses. CleanCo were trying to remedy this situation by firstly assigning all export orders to one warehouse, and then allocating specific customer accounts to the warehouses to generate a more customer centric

approach. Within the customer distribution network, RDCs were initially assigned by product type with CleanCo products being assigned to ambient warehouses. The secondary criterion was geography which, in the case of VolCo and ValCo, meant a North-South divide. The stores were the link to consumer demand for CleanCo products. The ranging decisions that acted as the gate keeper for the listing of CleanCo products was firstly determined on store size and then on the demographics of the store catchment area. Again this was an approach common to both VolCo and ValCo.

Hence what could appear to be sensible drivers of differentiation at an individual process level fail to connect to provide a coherent supply chain strategy within CleanCo. It also means that hypothesis HCS2:

'*Supply chain strategy is developed in response to the customer segmentation strategy'*

…must be rejected on two counts. Firstly, it must be rejected due to the absence of an overarching supply chain strategy. Secondly, because only one of the four core process strategies has a connection to the customer segmentation strategy and, given the low uptake of same day delivery, the service was obviously not developed in response to customer requirements. As explained in section 3.3.1.2 the hypotheses were developed to test for evidence of the theoretical 'ideal'. Given the challenging context in which CleanCo were operating it is not surprising that their supply chain strategy practices were not 'ideal'.

4.3.3 Performance Measures

Sections 4.3.1 and 4.3.2 have focused on the explanation of the core processes involved in developing market segmentation and supply chain strategy. In addition to explanation of the key processes Pettigrew (1992) also advocates the capture of the associated key outcome variables or measures.

CleanCo's performance measures were typically the process-oriented types of measure used by companies subscribing to a 'world class manufacturing' agenda to deliver operational excellence[58]. As illustrated in table 4-17, the measures tended to be process-specific, and the primary focuses were process efficiency and delivery reliability. Source focused on supplier delivery reliability, planning on the efficient use of inventory, make on Overall Equipment Efficiency (OEE), deliver on delivery reliability, and sales on sales turnover. CleanCo's use of performance measures was quite primitive and lacked a central mechanism for review. This made it difficult to collect information about those measures particularly related to performance against targets. CleanCo did not formally partake in external benchmarking activities though had started to compare some of the factory measures with other factories within CCIL. It was widely recognised that there were a number of deficiencies in the current approach to performance measurement. The most common complaint was that it lacked relevant and meaningful KPIs and as a result had too many measures.

[58] This essentially means the development of relevant measures of quality, price, delivery speed, delivery reliability, flexibility and innovation. These measures can then be used internally and externally to benchmark performance and drive improvement with the aim of becoming best in class.

Unit of Analysis	Key Performance Measures (KPIs)	Key elements	Target / Comments where available
Plan	Forecast accuracy	Compares forecast demand to actual demand 4 weeks out (Sept forecast for October actuals) Analyse by generic and by account	Target - 50% of all SKUs to have an accuracy over 80%
	Inventory level	Total value	Target - £5.5 million
	Stock turns	Forward looking	
	Days cover	Currently historical, but going to be forward looking	
Source	Vendor performance system	On time delivery	
Make	OEE (%)	Availability (%) x Quality (%) x run rate (%)	
Deliver	Service level	Order fulfilment, on time deliveries	
	Lost sales	Every case of lost sales, measured in pounds. Doesn't have a time element as long as it is measured it doesn't matter when.	Target - was 98.5%, increased to 99%
	Line fill (%)	Quantity of a line item successfully picked & despatched	Introduced instead of order fill
	Perfect order	Supply chain cut up into 5 chunks from order receipt to invoice. 5 chances to get it wrong.	Target unknown Performance around 10-15%.
	Account success	Promotional support (fees, multi-buy funding & discounts) Margin Cash (to a lesser degree)	
Sales	Account success	Sales turnover Net margin Trade expenditure (rebates & over-riders)	

Table 4-17: Summary of Key Performance Indicators in use at CleanCo

Key Issues with current approach to PM	Core SC Process	Detailed Comment
Lack of relevant and meaningful KPIs	Source	First area of importance is getting relevant and meaningful KPIs, to provide the visibility of what we do well and not so well (GCh#4) GCh was dismayed by the lack of measures when she started. She then investigated with the IT group how supplier information in the ERP system could be interrogated. GCh is under pressure to show the business that suppliers are not a bunch of shysters, which current interrogation of the system would indicate. This is because of GIGO syndrome (PMe #22)
	Make	Need to identify appropriate business drivers. OEE is not an appropriate business driver, unit cost is, however both CIL and CUK want OEE (GT #8)
	Deliver	Having to act ion based on historical experience due to a complete lack of data (DD#26)
Too many measures	Make	Too many operational measures at the moment, but you need to see them to make sure they happen. Once they are embedded can then back off (MJ#12)
	General	At the moment putting everything into the KPIs and will 1) whittle down to the more meaningful measures 2) identify the more holistic ones. This is part of the 'learning by doing' ethos (DA #7)
Confusion about unit of measure	Make	Confusion in the unit of measure: processing, tonnes, customers, cases, finishing, now cases used to be dozens (PB #14)
Tension between functional and business measures	Make	Ask a question and there is a conflict i.e. the difference between cash and efficiency e.g. can make more cash at 50% OEE, than at 80% (PM#15)
	General	A lot of people in the business have never worked outside the business and as a result have no real cash awareness (DA #7)
Lack of customer focused measures	General	A lot of the measures are introspective, and only a relatively small number are customer focused. This is expected to increase, as there is a move from measuring performance at product rather than factory level (DA#7)
Data not updated in a timely fashion	Source	Used to run a very good vendor performance system, but when moved all the ordering to site (logistics), it was not as controlled as when it was done by purchasing. There were delays in updating the system, which meant that the purchasing team needed to interrogate the system manually (ES #21)
No shared or common measures	Deliver	Different departments have different measures e.g. SOP key measure is number of orders, in warehouse it is volume (BB #2)
Inappropriate review period	Source	Designed a supplier performance reporting system that captured both objective and subjective measures. Was designed to be done annually, but was asked by manager to do quarterly. It was a very labour intensive process (PMe#22)

Table 4-18: Summary of the key issues with CleanCo's current performance management system

The measures that it did have lacked both customer and business focus and prioritised functional efficiency in some instances at the expense of the bottom line. One manager believed this was a downside of longevity of service which had resulted in an inward-looking and non-business like approach to running the business. Other issues included confusion around the unit of measure for KPIs with a lack of consistency across core processes, and in some instances different measures being used to measure what was essentially the same thing e.g. sales volume vs. number of orders. Consequently this meant that the CleanCo performance measurement system had no shared or common measures. These issues and their associated underpinning comments are summarised in table 4-18.

4.3.4 Relationship between MS & SC Strategy

The purpose of research question CS3 was to identify the relationship that existed between market segmentation and supply chain strategy. This was further expanded by hypothesis HCS3 which stated:

'There is a direct link between customer segmentation and supply chain strategy. Different behavioural segments drive different supply chain strategies.'

The CleanCo customer segmentation strategy was primarily determined by account sales value. This created a group of thirteen strategic accounts which were assigned key account managers. The remaining accounts were further segmented based on retail type – neighbourhood retail, discount and pharmacy. CleanCo lacked an overarching supply chain strategy and instead operated with a series of relatively isolated functional strategies designed to optimise functional performance. Within the 'deliver' process there was some evidence of a link to the customer segmentation process. CleanCo offered a quick response, same day delivery option to the thirteen key accounts − an option that was not available to its other customers. Despite significant tangible benefits, ValCo was the only customer who opted to use this service. The others preferred process standardisation across their ambient supply base to a lead time reduction that deviated from this process with a relatively small and non-strategic supplier. This questions the degree of customer insight that CleanCo has when dealing with its strategic accounts.

In summary, within CleanCo, the link between customer segmentation and an overarching supply chain strategy does not exist primarily due to the absence of such a strategy. Instead, a series of independent functional strategies that generally focused on the optimisation of their individual function, had no link to customer segmentation strategy. 'Deliver' was the one exception because it offered a differentiated level of service dependent on account status. Hence hypothesis HCS3 was found not to apply in the CleanCo case, but for explainable reasons.

4.4 Underlying Mechanisms

In line with the critical realist epistemology, the purpose of this section is to understand the underlying mechanisms that address research questions CS2 and CS4 and explain 'why' CleanCo adopted the approaches to customer segmentation and supply chain strategy that they did. Section 4.4.1 begins with a review of contextual factors that may drive the development of CRSC from both an internal and external perspective. Section

4.4.2 is more introspective and focuses on the identification of 'root causes' that, depending on context and/or use, enable or inhibit CRSC strategy.

4.4.1 Contextual factors

There were five contextual factors identified during the CleanCo study that impact on the development of CRSC strategy: globalisation, outsourcing, fragmentation, relative size and market polarisation. Each will now be discussed in turn.

4.4.1.1 Globalisation

CCIL is comprised of a number of historically independent operating companies that had their own products, brands, factories, and profit and loss responsibility. Historically the overarching regional structure allowed the individual operating companies a great deal of autonomy. This is now changing as CCIL seek to leverage the benefits of being an international company both in terms of scale and scope. Specific changes for CleanCo and its UK operations include the:

- Introduction of a bar soap manufacturing facility in the Far East
- Change of two of CleanCo's key brands from local to global brand status
- Use of regional or international contracts to leverage group purchasing power

Whilst the direct impact on CleanCo has yet to be fully ascertained, it is perceived that as long as there is a potential upside to the group internationally, this may be outweighed by the downside to CleanCo in the UK, as summarised in table 4-19.

Contextual Factor	Impact	Potential Upside	Potential Downside
Globalisation	Introduction of bar soap manufacturing facility in FE	Cost saving	Closure of factory 1
	Migration of 2 key brands from local to global brands	Increased global presence Product standardisation Reduced costs	Loss of local appeal
	Regional/International purchasing contracts	Cost saving	Loss of responsiveness & flexibility
Outsourcing	Spare capacity in the bar soap plant in UK	Become the No 1 branded and own label bar soap producer in Europe	Increased complexity to soap finishing process
	Increased usage of 3rd party manufacturing across Europe / World	Increased flexibility (peak production and NPI) Reduced costs	Loss of responsiveness (subject to 3rd party planning constraints) Increased lead times
Fragmentation	Increased number of SKUs	Increased market share Leverage global brands	Increased cost through increased complexity
Relative size	Relationship with customers and suppliers	Leverage relationships with external parties of similar / smaller size	Have little influence with significantly bigger external parties
Market polarisation	Demise of the middle market in developed countries. Replaced by increased demand for products that are obviously VFM or premium.	Leverage the premium market	Loss of market share if cannot grow share of premium market
		Leverage both the VFM and premium markets	Would require two different and potentially conflicting strategies

Table 4-19: Summary of key contextual factors and their potential impact on CleanCo

The introduction of a rival bar soap plant in the Far East calls into question the long-term sustainability of soap manufacture at factory 1 especially when the bar soap sub-sector is declining at around 8% year on year. This is an emotive issue on a site where soap has been made for more than 100 years. The challenge with migration to global brands from local equivalents is to ensure that local appeal is not lost. A scent that is attractive in the UK may not be attractive in southern Europe or Africa. And finally

there is the question of regional / international contracts – negotiation at this level may be attractive to leverage group purchasing power, but delivery reliability and responsiveness may be lost if contracts are not executed locally.

4.4.1.2 Outsourcing

CleanCo has felt the impact of an increased use of contractors in two ways. Firstly CleanCo is increasingly used by their UK competitors to make both branded and own label soap. This has the benefit of increasing the utilisation of the soap noodle manufacturing facility but is currently limited by CleanCo's ability to deal with the increased complexity at the soap finishing stage. If the complexity issue were resolved this would still pose a significant strategic issue to CleanCo as it would become increasingly difficult to differentiate their products in the eye of the consumer. Conversely, CleanCo are increasingly using 3rd party manufacturers to deal with peaks in demand and NPI. This trend could increase to the point at which CleanCo outsources all production to countries with a much lower cost base. The potential cost savings of such a solution need to be balanced against the increase in delivery lead times and reduction in flexibility as CleanCo has to adhere to third party planning constraints.

4.4.1.3 Fragmentation of Demand

Fragmentation of demand is a common feature of developed markets and typically results in the proliferation of SKUs as companies strive to maintain and increase market share. CleanCo are no exception to this phenomenon, the pressures of which will only increase as they pursue their product innovation strategy. They are trying to reduce internal complexity whilst maintaining the range on offer to the customer. This includes standardisation in the number of base components and the use of postponement.

4.4.1.4 Relative Size

CleanCo were a mid-size player in the washing and bathing sector in the UK and were not viewed as a strategic supplier by many of their key accounts. CleanCo's strategy is to attain strategic supplier status through a strategy of product innovation. Whilst leveraging their size might be problematic for CleanCo in the short term, opportunities existed in other parts of the supply chain. CleanCo's relatively small size was perceived to be an enabler to an integrated supply chain. It was perceived that CleanCo

'Have sufficient visibility of the chain to see the whole chain and therefore could make trade-off decisions' (PB#5)

Furthermore, from a purchasing perspective, size is also important to leverage bargaining power, and a commonly held view was that

'It is better to be a large fish in a small pond, rather than a small fish in a large pond' (ES #21)

CleanCo therefore needed to be aware of their size and to seek to leverage the benefits across the supply chain, where possible by working with partners of a similar or smaller size.

4.4.1.5 Market Polarisation

An interesting phenomenon in developed markets since the late 1990s is the demise of the middle market. The mid-market typically occupied the fat centre of the 'bell curve' in terms of sales volume whilst the VFM and premium markets occupied the much slimmer extremes. As the internet has provided consumers with greater transparency of products' features and pricing, consumers are less willing to pay an average price for an average product. They increasingly prefer to purchase either at the VFM or premium ends of the market depending on the purchase. CleanCo's brands were historically positioned at the mid-premium end of the market. The challenge for CleanCo is to decide where it wants to compete. The natural choice would appear to be at the premium end of the market and CleanCo are looking to acquire/develop a further brand to help consolidate their position as a premium brand. Strategically there seems less fit with CleanCo pursuing a VFM strategy, and the simultaneous pursuit of both markets would be very difficult for CleanCo, given the very different supply chain strategies it would require.

4.4.2 Enablers and Inhibitors

As mentioned previously in section 3.3.4.1, the intention when dealing with the enablers and inhibitors was to adopt a more explanatory approach based on content analysis and data arrays. The first stage in the analysis was to capture the raw inhibitors and enablers from the contact notes and carry out some preliminary coding and identification of the key factors and/or sub-factors[59]. There were 7 factors considered as enablers and 11 factors that were considered to be inhibitors, supporting 15 sub-factors. Full details of the inhibitor and enabler analysis can be found in appendices 13 and 14 respectively.

The next step was to consider the type of alignment that the factors affected and whether the impact was positive or negative. This analysis was only possible on the inhibitors as all the enablers were aspirational and were not relevant to current performance. As summarised in table 4-20, misalignment was commonplace in CleanCo. Strategic alignment was impeded by the inappropriate group boundaries that had developed between CCIL and CleanCo, and further exacerbated by what was perceived as a lack of business focus within CleanCo. Internal alignment was also poor and boundaries appeared at every possible interface − between SC processes, between the SC and marketing functions, and between centralised and decentralised functions. This was reinforced by the strong personal relationships that were found in individual silos. Further indicators were the lack of consensual definition both in terms of the technical language used generally within CleanCo and more specifically with the different units of measure used within the performance measurement system. External alignment with the customer was perceived as poor with limited customer focus in terms of KPIs and poor trust resulting in the misuse of information by customers, e.g. over-ordering when they know that there are potential shortages. The situation is slightly better in terms of supplier alignment, with strong relationships having developed across the SC between suppliers and CleanCo personnel. This can lead to

[59] Given the large number of inhibitors identified, a two step categorisation was used. This enabled the richness of data to be maintained at the sub-factor level whilst providing a more manageable number of inhibitors at the factor level.

decisions that are sub-optimum to CleanCo from a commercial perspective, and is another indicator of lack of business focus.

Alignment Type		Status	Factors	Sub-Factors
Strategic alignment		☹	Inappropriate group boundaries	Tension between group and operating company
			Performance measurement lacks business focus	Lack of business focus
Internal alignment	Between board & rest of company	☹	Inappropriate group boundaries	Initiatives don't permeate beyond board level
	Between HO & other sites		Inappropriate group boundaries Strong personal relationships within silos	Tension between centralised and decentralised functions
	Between marketing & SC functions		Inappropriate group boundaries	Tension between marketing and manufacturing functions
	Between the SC core processes		Inappropriate group boundaries	Disconnect between those responsible for the input & output of data
				Tension between manufacturing and logistics / planning
			Performance measurement has different units of measure	Different units of measure
External alignment	Customers	☹	Performance measurement lacks customer focus	Misuse of information
				KPIs not aligned with the customer
	Suppliers	😐	Strong personal relationships with suppliers	Strength of relationships drives incorrect business decisions
Cultural alignment		😐	Maintain status quo	Decisions not openly challenged…ignore them and they go away
			Fear of failure	Mistakes are punished
			Sub-culture	Sub-cultures
End to end suppl chain alignment		☹	Lack of consensual definition	Coding – same words different meaning

Table 4-20: The link between inhibitor sub-factors, factors and different types of alignment in CleanCo

Culturally whilst some sub-cultures do exist (e.g. in aerosol production) there is a more general CleanCo culture that permeates the organisation. This is underpinned by the assumptions that the status quo should be maintained, and by a fear of failure.

In trying to make sense of the relationship between the various different factors a framework was developed from the work of Edgar Schein (1992). The framework has three levels or layers.

- **Artefacts**: the outer, visible layer with its organisational structures and processes and group behaviours
- **Assumptions**: The hidden, heart layer with its unconscious, taken-for-granted beliefs, perceptions, thoughts and feelings. The source of values and action
- **Mechanisms**: the middle layer which seeks to find the underpinning enablers that link the underlying assumptions to the visible behaviour

The next step in the analysis was to categorise the factors identified in the enabler and inhibitor analysis as artefacts, mechanisms or assumptions. The majority of the factors identified were either artefacts or assumptions and the mechanisms emerged as the linkage between the two. The emergent culture map shown in figure 4-5 was based on an analysis of the inhibitors as they represented CleanCo's current state. At the heart of CleanCo was a set of assumptions – fear of failure, maintaining the status quo, silo thinking and a respect for authority – which underpin all actions taken within the

organisation. Visible manifestations of these values are all the remaining factors summarised in table 4-20, with the exception of those that refer to performance measurement. This is because performance measurement was identified as one of three emergent mechanisms, the other two being organisational design and information systems. The performance measurement system was developed functionally and had no central mechanism for review. The measures were not common across the business and lacked both customer and business focus. The organisational design was hierarchical, functionally organised and was supported by a 'command and control' leadership style. The information systems were also disjointed; the users lacked discipline which meant that data accuracy was poor and not timely. The net result was that there was poor visibility of what was happening within the business.

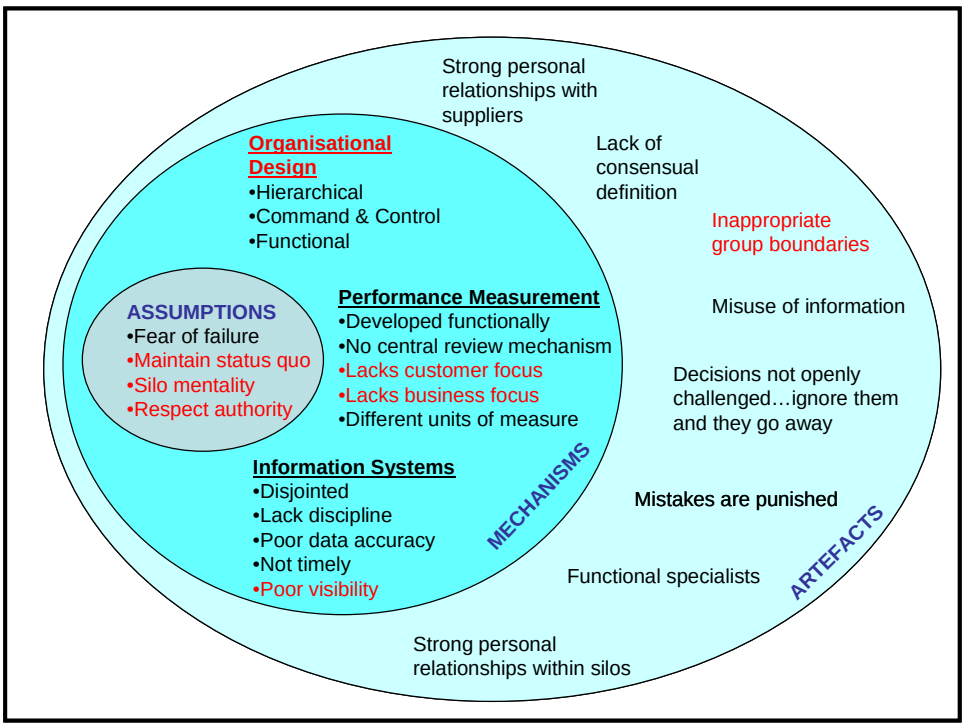


Figure 4-5: CleanCo – Levels of Culture (after Schein (1992))

Whilst these three mechanisms can be considered independently, it is the way that they interact with and reinforce each other that is the key to alignment within CleanCo. CleanCo were aware that changes needed to be made and the factors identified in red are those where the enabler review identified the need for change. More explanation of the links between the identified inhibitors and enablers is detailed in table 4-21.

Level of Culture	Current Inhibitor	Proposed Change (Enabler)
Assumptions	Maintain status quo	Good to challenge
	Silo mentality	Joined up thinking
	Respect authority	
Mechanisms	Performance Measurement • Lacks customer focus • Lacks business focus	Performance Measurement • Customer focused • Business focused
	Information systems • Poor visibility	Information systems • Provide visibility
Mechanisms/Artefacts	Inappropriate group boundaries / Organisational design	Appropriate group boundaries and hence organisational design

Table 4-21: The link between current inhibitors and suggested enablers at CleanCo

An overarching enabling factor was the need to change behaviour within CleanCo. This is essentially about redefining the assumptions from which CleanCo's actions are driven. There was a strong belief that the key to change was creating a company based on the assumptions that it is good to challenge, and that thinking should be joined-up. This requires a performance measurement system that is both customer and business focused and information systems that provide visibility. The importance of the correct organisational design to define more appropriate group boundaries and facilitate a joined up way of working was also recognised.

4.5 Potential for Improved Customer Responsiveness

Whilst CleanCo's current account value-driven approach to market segmentation does not provide a natural driver for supply chain strategy, the question remains whether a more appropriate means emerged from the study. A more detailed comparison of the operational aspects of the VolCo and ValCo accounts provides some interesting insights and is summarised in table 4-22.

	VolCo	ValCo
CleanCo turnover /annum (Ratio)	5	1
Time spent with account	80%	20%
Relationship	Good, but more difficult than ValCo	Good relationship
Customer Strategy	Promotions + EDLP	Promotions. Quirky, will sell higher value products that are 'different'
Promotions	Full range. Can be quite 'deep' due to size of account	Yet to do Buy One Get One Free (cash funding issue)
Number of depots	2	1
Order & Delivery Pattern	Order and deliver to each depot 2-3 times/wk	QR. Deliver 5 days/week.
Order lead time	3 days	Same day
Customer Forecast	Yes	No
Customer forecast accuracy	More noise in system due to deeper promotional activity	Driven by real sales through QR
Customer Category Plan	Yes	No
Buy Competitive Data	Yes	No
System Discipline	Poor. Still input data manually when have a computerised system. Extends to store discipline.	Good.

Table 4-22: Comparison of the VolCo and ValCo accounts

The VolCo account is approximately five times larger than the ValCo account in sales value terms and requires four times as much time to manage. VolCo pursues a strategy of Every Day Low Price (EDLP), which from a supply chain perspective means that the demand pattern should be relatively predictable and stable. This aligns well with the strategy of driving volume through low pricing which is made possible through a very efficient supply chain. Cost savings from supply chain efficiency improvements are passed on to the consumer to support further volume growth. This is the territory of the 'lean' supply chain and is planned using level scheduling techniques. Despite this core strategy, experience has shown VolCo that EDLP alone is not enough to drive sales growth, and they also require an aggressive promotional strategy to grow volume sales. This has had the result of creating 'more noise in the system' and has resulted in poor customer forecast accuracy. As a result CleanCo feel it necessary to purchase Electronic Point of Sales (EPOS) data to help them make sense of the account. In contrast ValCo operate a strategy of increasing margin to increase profit. This is achieved by delivering a more differentiated product range for which they command a higher margin. ValCo have a good systems discipline and replenishment is driven by

real sales through quick response, so forecast accuracy is not a relevant measure. CleanCo need to have flexibility and responsiveness within their supply chain to respond – particularly during promotional campaigns.

What begins to emerge is the opportunity to segment CleanCo's customers based on retailer strategy. For CleanCo's customers, this is the difference between having a volume or value driven strategy. Whilst this was not explicitly stated by the CleanCo business development managers, it was implicit in their customer segmentation as they frequently referred to the differences in customer strategy in terms of volume and value. From a supply chain perspective, this could be considered as the difference between a 'lean' or an 'agile' supply chain strategy. On validating this observation with the CleanCo management team, a secondary segmentation criterion within the volume driven strategy segment was identified – 'push' or 'pull' demand. EDLP is driven by consumer demand and hence is a 'pull' strategy. Discounters on the other hand are used as a 'push' outlet for B-grade products. They are offered 'job-lots' of obsolete or cosmetically sub-standard product at significantly discounted prices as they become available, a procedure that is totally independent of consumer demand.

The key to adopting a customer strategy-driven approach to customer segmentation is the isolation of promotional demand within its own segment. Promotions were common to the majority of CleanCo customers and had the impact of adding significant noise to relatively predictable demand. The majority of CleanCo promotions required specific promotional packaging which was more suited to a make-to-order manufacturing strategy. This in turn has a knock-on effect in terms of production planning, and sourcing strategy. It may also require a different type of 'deliver' strategy, with the potential to cross-dock promotional product direct to customer RDC or even store.

As summarised in figure 4-6, the opportunity for a more customer responsive approach to supply chain strategy formulation within CleanCo appeared to exist, based on a customer strategy-led approach to segmentation, and the separation of promotional and steady state demand. In the CleanCo case, the demand pattern was a significant driver of supply chain strategy which applied equally to all products whether they were deemed by CleanCo to be commodity (e.g. bar soap) or more innovative (e.g. aerosol).

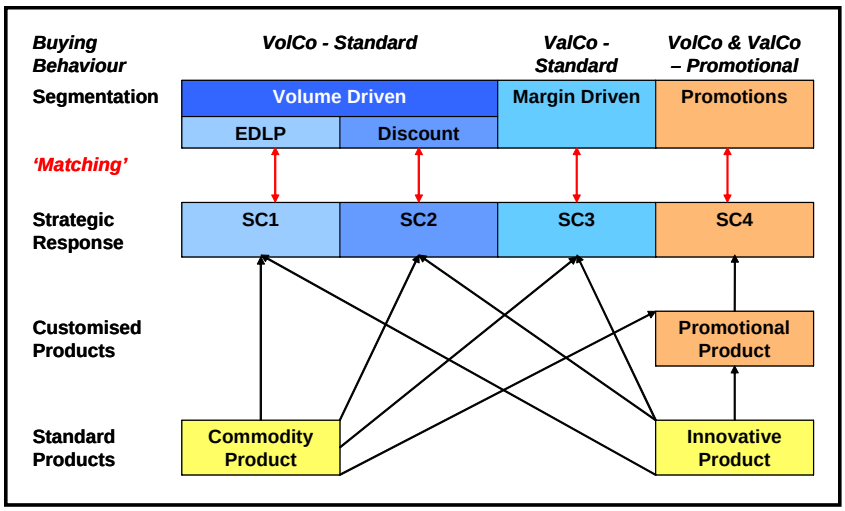


Figure 4-6: To illustrate the potential for CRSC strategy at CleanCo

4.6 Learning for Core Cases

There were five key learning points from the CleanCo case for consideration in the core cases: seniority/breadth of project sponsors, level of interviewees, co-collection of primary and secondary data, use of the project document, and use of the underlying mechanisms analysis from the CleanCo case as a starting point for further development. Each will now be briefly explained in turn.

4.6.1 Seniority and Breadth of Project Sponsor

It is important to ensure the project has sponsorship across the senior management team that will endure personality changes within the team. In the CleanCo case study the key sponsor was a minor player on the senior management team and was made redundant part-way through the study. This made it extremely difficult to finish the data collection elements of the study, particularly the KPIs. It also created some issues with validation as without a key sponsor there was no one internally within CleanCo to advocate the benefits of a feedback workshop and hence whilst we had validation of the findings from the individual interviewees it was not possible to gain a collective view.

4.6.2 Level of Interviewees

Interviews were conducted at both the senior and middle management levels within CleanCo – 29 interviews in total. This was a time-consuming process and there was generally a diminishing level of return from the interviews at the middle management level. The focus for the core cases was therefore directed at senior management and other key informants as identified as part of those interviews. It was envisaged that this would reduce the interviewees to around 20 per case.

4.6.3 Co-collection of primary and secondary data

It was assumed at the start of the fieldwork that access to CleanCo would be available throughout the case study. The initial focus was therefore on the collection of primary qualitative data with the assumption that the secondary requirements would be identified after initial analysis to provide triangulation for key points. In hindsight this was a naïve approach but the recommended approach for the core cases

4.6.4 Use of the project document

In order to help to clarify the commitment, scope and project management of the individual case studies, the use of a more formalised project document was recommended for the core cases. These documents did exist for the CleanCo case but in a more fragmented format. The idea was to pull them together into one living document that was signed off by all key parties involved in the study and would be subject to issue control.

4.6.5 Use of the underlying mechanisms analysis from the CleanCo case as a starting point for further development

A number of contextual factors that could drive the development of CRSC were identified from the CleanCo study. These factors appear to be quite universal in nature and therefore it is suggested that rather than starting the analysis for the core cases with a blank sheet of paper, these factors are used as a starting point. In a similar vein it is

suggested that performance measurement, information systems and organisational design are used as a starting point for investigating the mechanisms that link the assumptions to artefacts in the core cases.

4.7 Chapter Summary

This pilot case study had the dual purpose of providing data to answer the six research questions that underpin the author's doctoral studies and also to provide methodological learning for the subsequent core cases. In terms of addressing the descriptive 'what' research questions CS1 and CS3, it was found that CleanCo use account value as the primary means of customer segmentation. This resulted in two primary segments, key accounts (10 national accounts + the 3 largest field sales accounts) and field sales accounts. This approach had limited connectivity with supply chain strategy for two reasons. Firstly, a holistic supply chain strategy does not exist within CleanCo. Instead CleanCo have a series of process strategies developed in relative isolation. Secondly, account value does not provide a natural link to supply chain strategy. The exception was 'deliver', which offered a different level of service – same day delivery – to key accounts, whilst all other accounts were offered a standard level. On further investigation this did not appear to be very customer responsive as only one of the thirteen accounts used the service, indicating that it was not something that customers actually wanted. Research question 1 was supported by two hypotheses, HCS1 and HCS2. Neither of these was confirmed because customers were not segmented on buying behaviour, and supply chain strategy was not developed in response to these segments.

In addressing the explanatory 'why' questions CS2 and CS4, a number of drivers for developing CRSC from a contextual perspective were identified. These drivers were globalisation, outsourcing, demand fragmentation, relative size and market polarisation. These provided a business requirement for developing a more focused approach on whether to increase sales or minimise costs. The more introspective review of factors that enable or inhibit supply chain strategy provided an interesting insight to CleanCo. Analysis of the inhibitors identified 11 factors which contributed to strategic, internal, external and cultural misalignment within CleanCo. Further analysis based on an adapted version of Schein's (1992) cultural levels identified three mechanisms that provided a link between the visible manifestation of the inhibitors (artefacts) and the unobservable values and beliefs that formed the assumptions upon which company behaviour was based. These mechanisms were performance measurement, information systems and organisational design. The seven enablers identified at CleanCo were all future-focused, and recognised the need for change in behaviour. It was clear that the senior management team understood that the underlying assumptions and supporting mechanisms needed to change significantly to make this happen.

Research questions FP1 and FP2 were focused on the future potential for customer responsive supply chain strategy at CleanCo. Potential did seem to exist with the opportunity to segment customers based on their retail strategy, and the separation of promotional and steady state demand. This would create four customer segments – volume driven EDLP, volume driven discount, margin driven and promotions – from which meaningful supply chain strategies could be developed.

And finally – in terms of providing learning for the subsequent core cases – five main learning points were identified: seniority/breadth of project sponsors, level of interviewees, co-collection of primary and secondary data, use of the project document, and use of the underlying mechanisms analysis from the CleanCo case, as a starting point for further development. With this learning in hand, chapter 5 now introduces the first core case –ElecCo.

5 Core Case 1 – 4PLElecCo

5.1 Introduction

The structure for this case is the same as that of the CleanCo pilot presented in chapter 4, and is summarised in figure 5-1 below. It begins with an overview of the research context in section 5.2, before presenting the main content and outputs in section 5.3 and underlying mechanisms in section 5.4. Based on this analysis, the potential for improved customer responsiveness is explored in section 5.5 before the chapter is brought to a close with a summary in section 5.6.

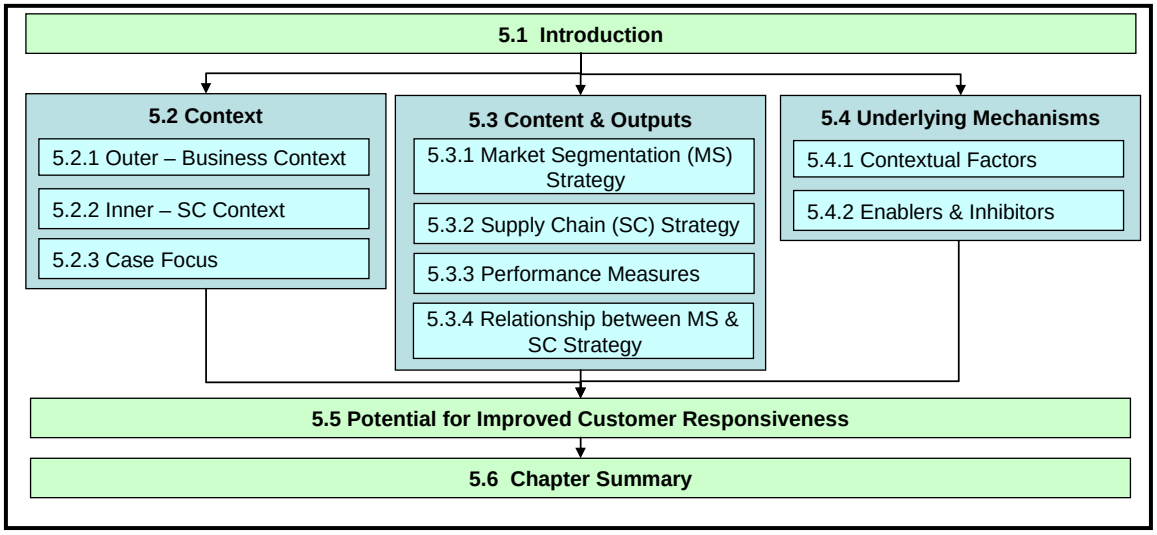


Figure 5-1: Structure for Chapter 5 (Core Case 1 – ElectronicsCo)

5.2 Context

This data was primarily gathered during a scoping study at the 4PLElecCo operation in Holland. Its purpose is to present the contextual factors which may impact on the development of CRSC strategy, and secondly to identify the focus for the main study. It is presented in three main sections: 5.2.1 Outer- Business Context, 5.2.2 Inner- Supply Chain Context and 5.2.3 Case Focus.

5.2.1 Outer – Business Context

The outer business context covers two main elements; section 5.2.1.1 provides background on the parent company 4PLCo whilst 5.2.1.2 gives a more detailed overview of 4PLElecCo in terms of its products and structure (5.2.1.2.1), competitors (5.2.1.2.2) and customers (5.2.1.2.3).

5.2.1.1 4PLCo – The Parent Company

4PLCo was founded in the early 1900's in the USA and its roots are in the distribution of mail and parcels. What started as a regional business grew to one with full US coverage as 4PLCo gained expertise in acquiring and integrating other operations.

The first European operations were launched through acquisition of a Dutch company in the 1980's. Since then 4PLCo has continued to develop its European base and at the time of the case (i.e. 2002) had a strong European presence. It is a publicly listed company and in 2002 employed 380,000 employees worldwide.

4PLCo was a cash rich business and having its expanded its US parcel (4PLParcelsUS) based business to the international arena (4PLParcelsIntl) and developed an airfreight business (4PLAirfreight) was looking for further opportunities for growth. Hence 4PLCo created the 4PLSCS division to manage its global accounts and look for innovative new ways to develop supply chain solutions. Within 4PLSCS there were two sub-divisions: 4PLFS and 4PLElecCo. 4PLFS focused on the provision of financial services both internally and externally. 4PLElecCo dealt with the design and re-engineering of supply chains, acting as an enabler for virtual networks, bridging the gap between traditional consultancy and in house implementation. 4PLElecCo was the focal firm in core case 1 and its operations will now be described in more detail. Its position in the 4PLCo divisional structure is shown in figure 5-2.

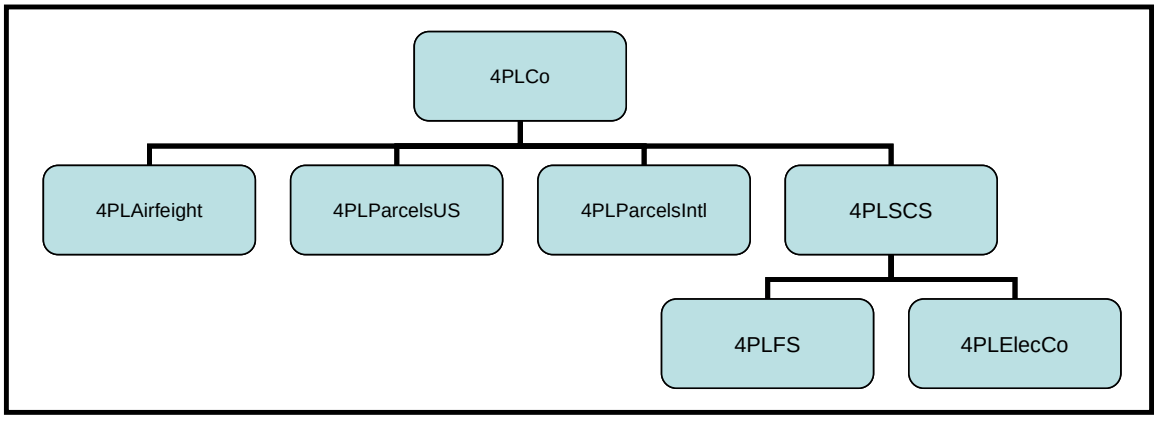


Figure 5-2: Position of 4PLElecCo in 4PLCo Divisional Structure

5.2.1.2 4PLElecCo

Since its formation in the early 1990s, 4PLElecCo has grown organically through the development of new accounts, whilst gaining new capabilities through acquisition. 4PLElecCo's competitive advantage comes from its global presence and one system for central, regional and local delivery, comprising:

- 1 central location
- 5 regional locations
- 600 forward delivery points
- 3000 pick up/drop off points

It has the capability to operate automatic replenishment systems and can finance inventory, having an AAA rating. The European distribution centre was established in 1996 and is the focus for the case study. The initial focus for the distribution centre was the EU 15/2[60] countries with 4PLElecCo expanding rapidly into the new EU accession countries e.g. Hungary, Poland, Czech Republic and Slovenia.

[60] These were the 15 countries that were part of the EU in 2002 + Switzerland and Norway

4PLElecCo is interested in design and flow, rather than asset or physical network ownership. It advocates a virtual approach that maximises asset flexibility and intellectual capital, providing the opportunity to flex capability. This structure is based on negotiated contracts and fair treatment in an uncertain environment (e.g. as regards asset amortisation when supply chains change). Rather than responding to tenders, 4PLElecCo LG prefer to seek out likely clients, or be approached directly. A team would be set up to develop proposals, identify benefits and, if successful, agree phasing and implementation. Programmes are predominantly concerned with rationalisation – particularly across current national divides, such as the EU member states. Solutions are targeted at the supply chain level, rather than individual organisation level, as the improvement opportunity is so much greater. Growth is through value acquisition along the chain, revenue acquisition facing the customer (market share) and increasing velocity to deliver shareholder value. Competencies are based on the management of information flows and cash flow management

5.2.1.2.1 Products & Structure

There are three main products offered by 4PLElecCo:

- Transportation
- Supply Chain Management (SCM)
- Service Parts Logistics (SPL)

Transportation is the most basic product offered by 4PLElecCo and in its simplest form is the movement of product from one place to another. SCM provides warehousing, third party distribution and a range of value-add services such as configuration of hard disc drives, control of the SCM aspects of spare parts, vendor managed inventory, and quality checks on receipt and consolidation. It is a 'cash cow'[61] and produces 95% of profits for 4PLElecCo. From a strategic perspective it is therefore important to 'support and maintain' the SCM product. SPL aims to provide a network for field support (Pick Up and Drop Off – PUDO) and is seen as an area for future growth. The division believed it had identified a gap in SAP/BAAN[62] enterprise resource planning (ERP) system capability in terms of returns/repairs flows and was developing the business infrastructure and system to bridge it. Both the transportation and SPL businesses are located in Germany as these are the key markets for these businesses with a bias towards the automotive industry. The SCM business operates out of the Netherlands with much of its business focused on the UK and Benelux.

In addition to this product-driven structure, each country within EMEA has a country manager, since there is a legal requirement to do so. Country managers are really concerned with facilities and people, and their role is to ensure that the businesses make use of every part of a country's market opportunities. The Netherlands is an important country to 4PLElecCo as its contribution (20-30%) equals the combined contribution of France, Germany and the UK. A summary of the product/country strategic positioning is summarised in table 5-1.

[61] Cash cow - product or a business unit that generates unusually high profit margins: so high that it is responsible for a large amount of a company's operating profit. This profit far exceeds the amount necessary to maintain the cash cow business, and the excess is used by the business for other purposes

[62] SAP and BAAN are major providers of ERP systems

Country	Product		
	Transportation	SCM	SPL
Netherlands and Benelux		Cash cow	Start up
UK		Dominant - Cash cow	
Germany	Dominant - Cash cow		Start up

Table 5-1: 4PLElecCo product/country strategic positioning

5.2.1.2.2 Competitors

The marketplace is changing: there are fewer players who are tending to polarise either into generic competitors[63] or niche players[64]. Barriers to entry include relatively low margins, extensive infrastructure requirements and hence investments can take a long time to pay back. The 3PL[65]/4PL[66] arena is both very competitive and very "inbred", with much supplier-hopping. 4PLElecCo are still 'young kids on the block' in Europe and have lots to gain.

Many businesses are still owned by regional players, with local laws preventing easy acquisition of these companies, e.g. if you acquire the company, you can't simply impose your terms and conditions. The social part of an employer's costs is high, particularly if you employ your own drivers. 4PLElecCo avoid many of these costs by operating a virtual network and buying-in these services as required.

5.2.1.2.3 Customers

A long-term approach to client relationships was adopted by 4PLElecCo as it seeks to help its clients to establish virtual networks to service niche industry streams in the ICT[67], telecommunications, automotive, healthcare and luxury goods sectors. Its focus on global accounts means that it tends to deal only with Fortune 500 listed companies. Clients would typically be operating outside 1.5 standard deviations from the industry norm in terms of inventory turnover, supply chain working capital, sales revenue, growth rates or capital base. Such indicators show clients to be either 'a victim of their successes' or poor performers in terms of asset base return.

ElecCo is 4PLElecCo'second largest customer in Europe, and is responsible for 50% of the profit contribution for the Netherlands. ElecCo is an innovative customer and drives the pace of change within 4PLElecCo's suppliers. For example, 4PLElecCo has developed outbound1.com with outbound to facilitate ElecCo's track and trace requirements. The combination of its size and innovative practices made it a good choice of customer for the case study. Hence the study was focused on the way that 4PLElecCo service ElecCo's European customers. ElecCo use 4PLElecCo for a combination of transportation and SCM services. The ElecCo contract is now described in more detail.

[63] Generic players - operate across a number of different markets with a range of different products
[64] Niche - focus on providing a limited number of services in a limited number of markets
[65] A 3PL, or third-party logistics provider, is a firm that provides outsourced or "third party" logistics services to companies for part, or sometimes all of their supply chain management function.
[66] A 4PL is an integrator that assembles the resources, capabilities, and technology of its own organisation and other organisations to design, build and run comprehensive supply chain solutions.
[67] ICT- Information & Communications Technology

5.2.1.2.4 The ElecCo Contract

Given the size and strategic importance of the account, 4PLElecCo has a separate business unit dedicated to servicing the ElecCo account. It is assigned an account director, at a global level, who is responsible for overseeing the relationship with ElecCo in all regions. At the European level the account is headed by an ElecCo contract manager who has a dedicated team of four: a transport manager, operations manager, customer service manager and account manager.

ElecCo was the second large account won by 4PLElecCo. The (rolling) contract with ElecCo is now in its fifth year. The EMEA[68] market accounts for 31% of ElecCo's global sales, and is ElecCo's second largest market after the US. Since 1999 the business has been doubling year on year, but 2002 saw a stabilisation of this growth, as illustrated in figure 5-3.

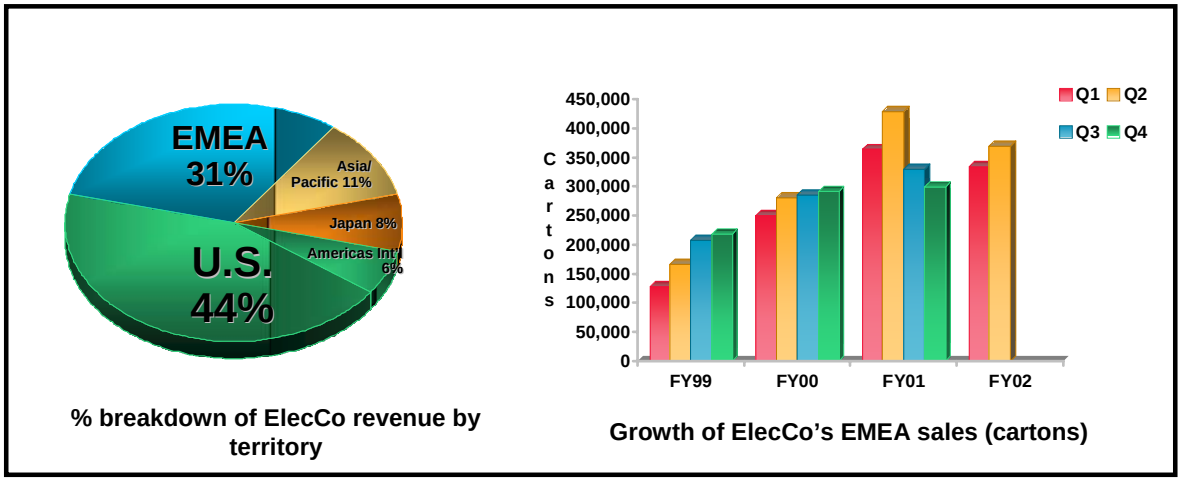


Figure 5-3: ElecCo – Statistics that position their European Business

At the time the venture was set up, predictions were for an $11-12 billion market: this is actually now $23 billion sold. ElecCo was a very young company, limited to the US bay area and with 180 carriers picking up from ElecCo manufacturers. The original business model was designed to support movement of a maximum of 3,000 boxes per week. Current volumes are 60,000 boxes, 8,000 shipments a week to approximately 60 customers. The Netherlands was chosen since it was the first nation to sort out its import/export legislation, although this is now more harmonised across both Belgium and Germany. During this expansion, the account has moved its operations from Eindhoven, to a larger distribution site at Herkenbosch, which services nine customer contracts in addition to ElecCo. This, as well as allowing for expansion of the business, has the added benefit that resources can be shared, if necessary, across the various accounts managed from this facility.

The 4PLElecCo supply chain is operated on the basis of an outsourced centralised logistics model for the process of picking up products from manufacturing plants and delivering them to the customer. 4PLElecCo is used as the EMEA hub because it adds value in terms of systems and in terms of managing second and third tier suppliers.

[68] EMEA – Europe, Middle East and Africa

ElecCo values the relationship with 4PLElecCo, because it does not want to manage multiple relationships with the other tiers. Although delivering straight from the factory to the customer would theoretically shorten lead times ex-factory, the use of a central consolidation point enables consistent management of large volumes to a guaranteed level of service. Customer service is very important to ElecCo and this translates into four areas of focus for its logistics (delivery) processes:

1. On time delivery: ensure deliveries are predictable, accurate and visible
2. Delivery throughout EMEA: manage delivery of product anywhere
3. Total acquisition cost: focus on reducing all supply chain costs
4. Lead time reduction: remove non value-added steps, handoffs

5.2.2 Inner – Supply Chain Context

The SC context under study is the ElecCo EMEA supply chain that is managed by 4PLElecCo. ElecCo offers all its customers the option to 'opt-in' and use its logistics service or to 'opt out' and designate their own logistics provider. In 2002 70% of ElecCo's customers chose to 'opt-in'. 4PLElecCo manages EMEA 'opt-in' deliveries for ElecCo from the strategic logistics centres (SLC)[69] to the customer and hence this is the scope of the supply chain. InboundCo have three days in which to collect the orders from the SLC and deliver then to the European Logistics Centre (ELC) for EU 15/2 customers (which account for 95% of sales by value) and to freight forwarder in Amsterdam for REMEA[70] customers (accounts for 5% of sales by value). 80% of product (20% by sales value, 60% by volume) of goods bound for the ELC are of non-EMEA origin with the majority of factories located in the Far East, US and Mexico.

4PLElecCo deals with two types of product. Firstly, product that is complete and just requires shipment and secondly product that requires a degree of simple customisation (e.g. addition of a country specific power cord). Complete product flows direct from the SLC to either the ELC or freight forwarder, depending on the country of delivery. Customised product goes via a 4PLElecCo manufacturing site in either Herkenbosch (the customisation centre - CC) or Hungary. The ElecCo Supply Chain is summarised in figure 5-4.

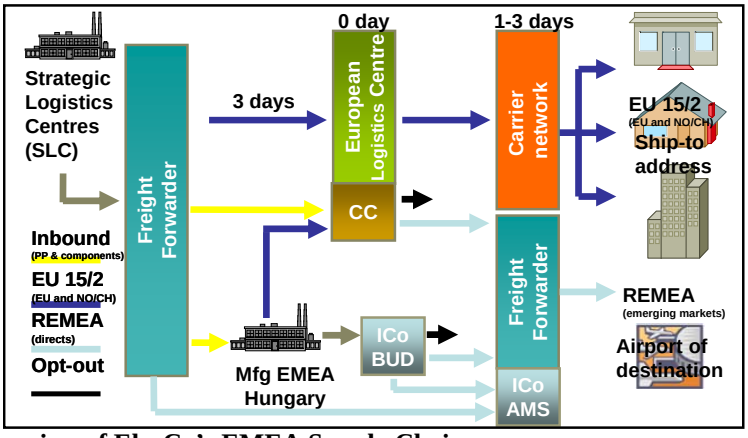


Figure 5-4: Overview of ElecCo's EMEA Supply Chain

[69] There are 9 SLCs across the globe that receive the output from 30 factories
[70] REMEA – Rest of EMEA i.e. all EMEA countries that are not EU 15/2

ElecCo have a three tier distribution strategy. They provide product directly to their top 100 first tier service provider (SP) customers (e.g. Tiscali, BT and Deutsche Telecom) and also to the seven tier ElecCo Distribution Partners (EDPs). On average they ship to 60 customers/week. ElecCo have identified a third tier of 15 suppliers – ElecCo Authorised Distributors (EADs) – who purchase their products from the EDPs. Tier 1 customers can purchase product from any channel. Tier 2 customers can purchase products from EDPs or EADs and tier 3 customers can only purchase products from EADs. The links between channels and customers is summarised in figure 5-5.

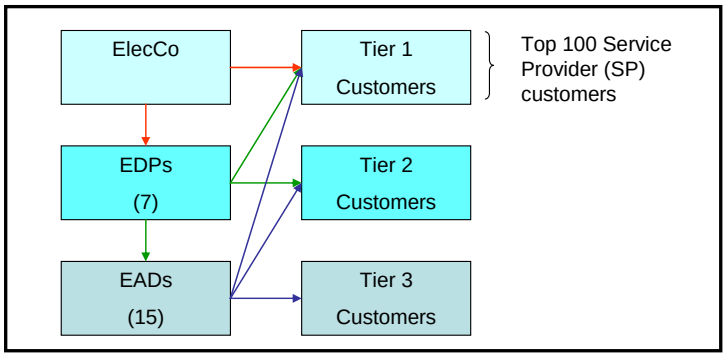


Figure 5-5: Relationship between ElecCo distribution channels and customers

Customers who can receive product direct from ElecCo and choose to 'opt-in' have a choice of a 24-hour (platinum) or 3-day (gold) level of service from the ELC to customer. 85% of EU 15/2 customers opt for the gold level of service whilst only 15% opt for platinum. Logistics charges are calculated as a % of order value and service level choice. 4PLElecCo uses three named carriers (Outbound1Co, Outbound2Co, and Outbound3Co) and approximately 10 specialists.

In short, the ElecCo EMEA 'opt-in' logistics service offers:

- Door to door service with EU 15/2 countries
- Door to airport service for REMEA (non-EU 15/2) countries
- Guaranteed daily lift at all origins
- Use of premium carriers throughout the chain
- Choice of 1 or 3 day delivery option
- Customers have total visibility of their order from receipt by InboundCo through the 4PLElecCo developed track and trace system

The top level dimensions for the ElecCo EMEA SC are summarised in table 5-2.

Source	Make	Deliver	
Suppliers	***ELC***	***Carriers***	***Customers***
1 Freight Forwarder InboundCo 3 Airlines	***Customisation Centre*** ***Stock Keeping Units*** 5 cable variants	3 named carriers + approx 10 specials Named Carriers: Outbound1Co Outbound2Co Outbound3Co	1 client - ElecCo Ship to 107 customers on their behalf (on average 60 customers/ week)

Table 5-2: ElecCo EMEA Supply Chain – Top Level Dimensions

5.2.3 Case Focus

As explained in chapter three, given the complex nature of supply chain management one of the purposes of the initial scoping study was to provide a focus for the more detailed case study exploration. The focus for the 4PLElecCo study was on the ElecCo account, a strategically important customer that drives innovation and is responsible for 50% of the profit contribution of 4PLElecCo in the Netherlands. 4PLElecCo was responsible for managing EMEA 'opt-in' deliveries from factory of origin to the customer and this is essentially the service that they offer. 4PLElecCo was keen to understand why 20% of ElecCo's customers chose to opt out and hence the case study included both 'opt-in' and 'opt-out' customers. It was decided that all selected customers would be ElecCo Authorised Dealers (EADs). This was because ElecCo did not want its direct customers involved. There was therefore a degree of enforced selection of the customers interviewed. ElecCo was concerned that this could raise expectations that it would then be unable to fulfil. The only other group of customers to whom 4PLElecCo delivered directly was the EADs. Within the EADs, ElecCo carefully vetted the selection of customers who could partake in the study. OptOutCo was selected as the opt-out customer as they were the leading networking solutions group in Europe. Their turnover in 2002 was £620 million. OptIn1Co and OptIn2Co were selected to represent the extremes of opt-in logistics capability. OptIn1Co required single point deliveries whereas OptIn2Co required drops to multiple locations. Both companies have a global presence but have different business models. OptIn1Co focuses on the worldwide provision of logistics services for technology products and their turnover in 2002 was £8 billion. OptIn2Co build and manage IT infrastructure, applications and networks. Their turnover in 2002 was £1 billion. Table 5-3 provides a summary of the key attributes of these three customers.

ElecCo EAD	Logistics Service	Service	Drop Off Points	Coverage	Turnover (£ billion)	No. Employees
OptOutCo	Opt Out	Networking solutions	Single	Europe	0.62	1400
OptIn1Co	Opt In	Logistics services for technology products	Single	Global	8	7,900
OptIn2Co	Opt In	Build and manage IT infrastructure, applications and networks	Multiple	Global	1	10,000

Table 5-3: Comparison of 3 focal EAD customers for 4PLElecCo case

This case study is slightly different from the CleanCo case study as the focal firm does not actually have its own supply chain but manages the ElecCo EMEA supply chain on its behalf. From a SCOR® perspective, the core processes still apply but in a service context. The case study was selected as it provided a contrast of a traditional vertically integrated supply chain structure with a more contemporary outsourced approach. 4PLElecCo manages the planning activities from factory to EAD as the 'plan' process spans the full scope of the supply chain. Inbound logistics (source) is managed by InboundCo. 4PLElecCo operate the ELC (make) and goods are either collected by a customer nominated carrier for opt-out customers such as OptOutCo, or distributed by 4PLElecCo nominated carriers (eg. Outbound1Co, Outbound2Co and Outbound3Co) for opt-in customers (e.g. OptIn1Co and OptIn2Co). This is the 'deliver' process. Figure 5-6 provides a summary of the ElecCo EMEA supply chain and the research focus for the case study. It also shows how the core supply chain processes apply to the case.

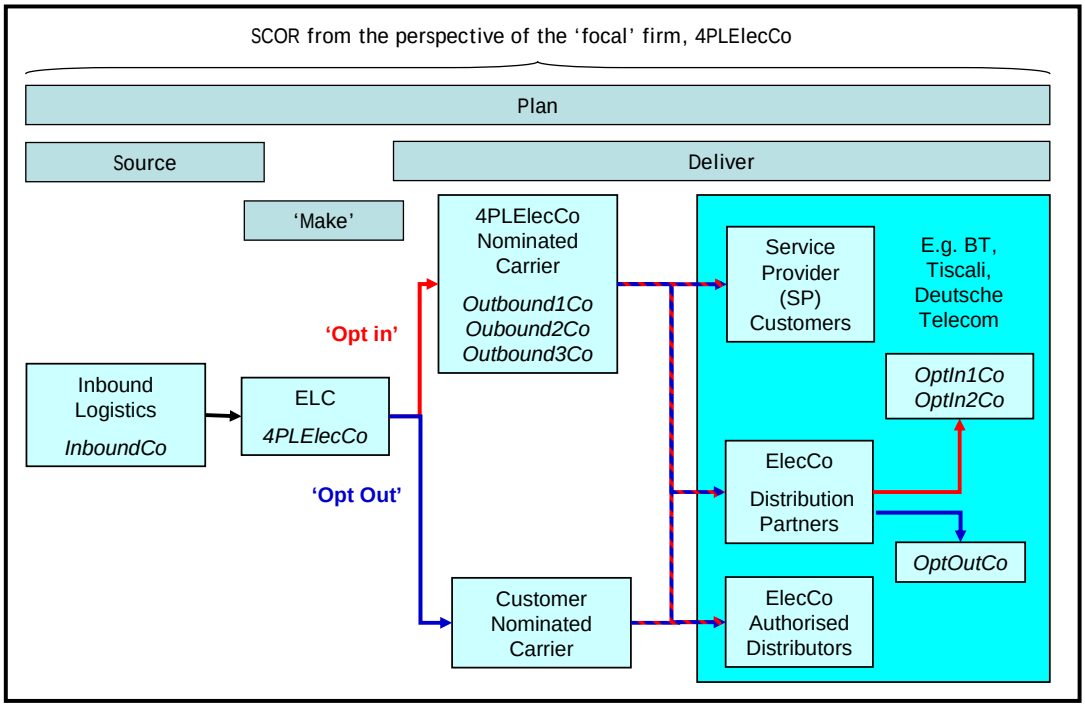


Figure 5-6: Overview of the ElecCo EMEA Supply Chain reflecting the Research Focus

The purpose of the research focus was to enable questions to be focused at both a specific level as well as a more general level in an attempt to understand what factors drove the decision making process at different stages in the supply chain. The focus for the 4PLElecCo case is summarised in table 5-4 and a summary of the primary data sourced is listed in appendix 15.

Parameter	Focus for the 4PLElecCo Case
Operating Business	4PLElecCo
Business	ElecCo supply chain
Category	EMEA
Sub-sector	EU15/2
Product / Service	'Opt in' and 'Opt out' delivery solutions
Channel	ElecCo Authorised Dealers (EAD)
Customers	2 'opt in - ' OptIn1 and OptIn2 1 'opt out' – OptOut
Suppliers	Inbound logistics – InboundCo Outbound logistics – OutboundCo1, OutboundCo2, OutboundCo3

Table 5-4: Summarising the Focus for the 4PLElecCo Case

5.3 Content and Outputs

This section focuses on providing the response to research questions CS1 and CS3 which focus on the descriptive 'what' questions. Section 5.3.1 focuses on understanding what drives 4PLElecCo / ElecCo's market segmentation strategy and section 5.3.2 their supply chain strategy. This is explored at both a holistic level and also within the individual core supply chain processes (Plan, Source, Make and Deliver).

5.3.1 Market Segmentation (MS) Strategy

Given that 4PLElecCo is the focal firm for the case study, but it is the ElecCo supply chain under study, it is necessary to consider the market segmentation strategies of both companies.

As previously mentioned in section 5.2.1.2, 4PLElecCo European operations have an unconventional model for business development in Europe. They prefer not to respond to tenders but to approach clients or respond to client requests. They are primarily interested in Fortune 500 companies with a global presence. Whilst the industrial sector is not a limiting factor, clients tend to be niche players in high margin sectors. This targeted approach to client management results in the identification of a limited number of high value and strategically important accounts. The objective was to:

'develop new opportunities with accounts to meet the customers demand in the most efficient and cost effective way with a profitable margin for 4PLElecCo' (FH#1)

The Netherlands operation – which was the focus for this case study – managed ten accounts. Although this small selection of accounts was essentially hand-picked, there was still differentiation in the service level offered based on the sales value of the account. The top three accounts by sales value each had their own dedicated management teams and operations within the ELC. The other seven smaller accounts had shared management and operations. There was some secondary division of resources based on sector as there tended to be some commonality in the logistics service required.

As described by the ElecCo EMEA Operations manager, the method of segmentation was more clear-cut.

'We have a 2 tier system in Europe for selling our products' (EdB#2)

ElecCo made a distinction between vertical and channel customers. Vertical customers were the large service providers (SP). These were the largest 100 accounts in terms of sales value as they buy high-end equipment for which they are willing to pay a premium. All remaining customers receive their products through indirect sales channels. As mentioned in section 5.2.2, ElecCo has designated 7 distributors as their ElecCo Distribution Partners (EDPs) and 15 ElecCo Authorised Dealerships (EADs). EADs deal with customers who place small and infrequent orders and hence have the lowest sales value. The EDPs deal with the medium-sized customers by account value and also the EADs, as ElecCo did not deal directly with EADs. Hence the ElecCo customer segmentation model is also driven by sales value. The primary and secondary bases of segmentation for 4PLElecCo and ElecCo are summarised in table 5-5.

Company	Bases of Segmentation			
	Primary		Secondary	
	Bases	Example	Bases	Example
4PLElecCo	Account value	Top 3 accounts by account value	Sector	ICT, telecommunications, automotive, healthcare and luxury goods
ElecCo	Account value	Vertical or channel	Channel	EDP, EAD

Table 5-5: Primary and secondary bases of segmentation in 4PLElecCo /ElecCo (2002)

For both 4PLElecCo and ElecCo there was a strong link between the customer segmentation and the customer account management process. In both cases, the largest accounts by value had dedicated account managers/teams, with smaller accounts having to share resources. This was based on account value rather than customer needs and hence hypothesis HCS1:

'Customers are segmented based on buying behaviour driven by an understanding of customer value'

…must be rejected as this was not the method of segmentation used by either 4PLElecCo or ElecCo.

5.3.2 Supply Chain (SC) Strategy

This section begins by looking at the way in which 4PLElecCo / ElecCo management decisions drive differentiation in each of the core supply chain processes before considering their overarching supply chain strategy.

5.3.2.1 Plan

It is the responsibility of 4PLElecCo to manage and hence 'plan' the operations for the ElecCo EMEA supply chain. There are two types of 'products' that the supply chain deals with.

1. Standard cartons − the content of which is generally irrelevant[71]
2. Customised cartons − which require a power cord or switch adding to them in the customisation centre (CC)

The planning processes for finished cartons and customised cartons are different and each will now be described in turn.

5.3.2.1.1 Standard Cartons

This is a supply chain which is concerned with the movement of cartons. It also has to respond to demand as it occurs as ElecCo do not provide a forecast or advance visibility of demand.

'When he started the new VP at ElecCo promised forecasting, but it is very difficult to implement as ElecCo are a build to order company e.g. if a good sales guy is on holiday then sales can go down and when he comes back they go up' (CK#7)

Demand was made visible through the 4PLElecCo / ElecCo information system. This was a highly integrated system with interfaces that linked all parties[72] involved in the ElecCo EMEA supply chain in real time. ElecCo made a conscious decision to limit the visibility of product in the factory to 4PLElecCo. There was a concern that by giving 4PLElecCo too much information this could affect the power balance of the relationship. The first visibility of the demand on their logistics network was when product entered the ElecCo Strategic Logistics Centre (SLC) located close to the point

[71] They only affect the supply chain in terms of their physical attributes eg. weight and size.
[72] This included InboundCo, 4PLElecCo, ElecCo, Outbound1Co, Outbound2Co, Outbound3Co and other specialist carriers

of manufacture. This was typically three days before goods were received at the ELC. In essence the supply chain was demand driven and reacted to the demand placed upon it with limited formal planning activity. 4PLElecCo did track previous demand and used basic statistical tools to help predict future demand. To quote the ElecCo account manager:

'With no meaningful forecast, we predict volume based on a quarterly 'reverse hockey stick' effect and historical information' (OV#4)

This pattern is illustrated in figure 5-7. The vertical lines show the end of the financial quarters when ElecCo report their results to the stock market.

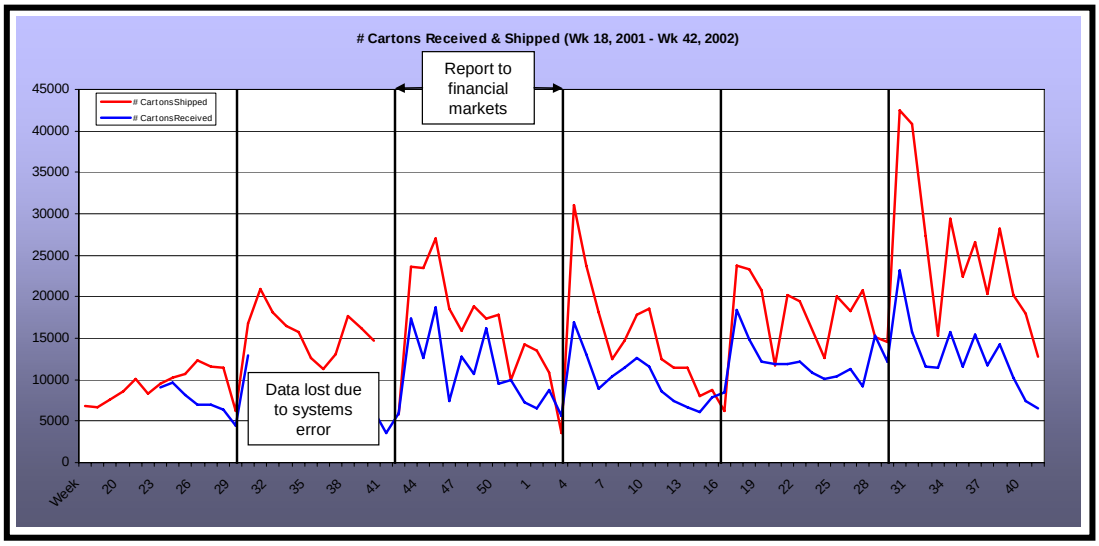


Figure 5-7: Graph showing the # cartons processed by the ELC (wk18 2001 - wk42 2002)

What can be seen is a significant drop off in cartons processed[73] by the ELC in the two weeks prior to reporting and a corresponding uplift in the two weeks after the announcement. This is driven by ElecCo's desire to impress the financial markets with a consistent performance against targets. To achieve this, ElecCo provide the financial market with conservative estimates of performance which are typically achieved two weeks before the end of the financial period. Once achieved, not wishing to over-perform ElecCo stop the shipment of product to customers; after the announcement has been made the backlog of customer orders can then be shipped. As illustrated in figure 5-8, the manipulation of customer demand by ElecCo in response to their financial reporting cycle had a significant impact on the supply chain. The mean number of cartons received (Received) was 10,798 but the supply chain needs the capability to deal with demand as low as 1,505 and as high as 20,091 cartons. The picture is very similar for cartons despatched (Shipped) with a mean of 16,443 cartons and an upper limit of 25,023 cartons and lower limit of 7,863 cartons. 4PLElecCo responds to these variations in demand through:

[73] Cartons processed – refers to both inbound (received) and outbound (shipped) cartons. The shipped figure is higher than the received figure as it includes both standard and customised cartons whereas the inbound figure is just for standard cartons.

1. Excess capacity – particularly in the carrier network
2. Labour flexing (use of temporary staff) – particularly for known busy periods
3. Sub-contracting – have preferred sub-contractors which can be used, often 'badged'[74] as contracting carrier

There is obviously a cost premium to using these services and the irony is that this unnecessary increase in supply chain costs actually erodes the shareholder value that it is trying to protect.

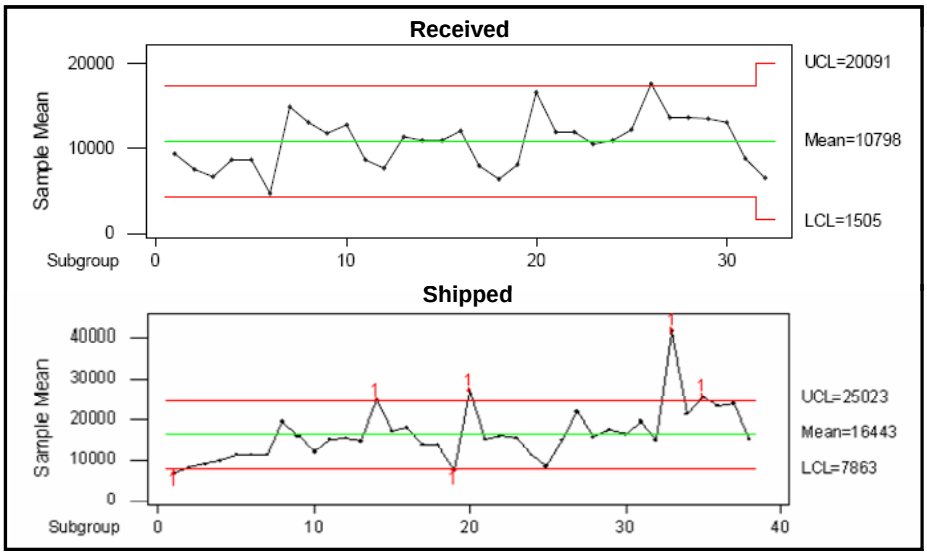


Figure 5-8: Graphs showing demand variability of cartons processed by ELC (wk18 2001 – wk42 2002)

5.3.2.1.2 Customised cartons

For customised cartons 4PLElecCo receive a 4-week rolling forecast from ElecCo which is provided by the ElecCo Master Production Scheduler. To quote the operations manager:

'It is quite a lean, MRP[75] driven type system that responds to the pulse set by ElecCo' (RvA#4)

The planning unit is cartons and 4PLElecCo is set a 'Day Go Rate'[76] (DGR) by ElecCo which is the rate at which they are expected to customise. Within the 4-week planning horizon there is a 13-day fixed period. Any outstanding orders within this fixed period are termed 'backlog'. The plan is updated on a daily basis and performance against plan is also reviewed daily with ElecCo by means of a conference call.

[74] 'badged' – from the customer's perspective the sub-contractor is made to look as if it works for the contracted carrier eg. uses contracted uniform and paperwork.
[75] MRP – Material Requirements Planning – the calculation of how many materials are required and at what time.
[76] Day Go Rate = Monthly requirement / number of working days in month

In summary, from a 4PLElecCo planning perspective the planning process is differentiated depending on the product type – standard or customised cartons. For customised cartons 4PLElecCo essentially responds to the demand as it occurs. It deals with fluctuations through the deployment of excess capacity, labour flexing and sub-contracting. The planning unit is 'cartons' and there is essentially one SKU. Given the "inverse hockey stick" trend linked to the end of financial quarters, 4PLElecCo has an informal 12-week planning horizon. There are no time fences and the company responds to all demand as it occurs, hence the frequency of review is daily as are the planning buckets. In contrast, the planning of customised cartons is more formal and driven by ElecCo's MRP system. The planning unit is cartons, and there is a formal 4-week planning horizon – within which the first 2 weeks could be considered as a fixed period, and the remaining 2 weeks as a slush period. 4PLElecCo builds to a DGR hence the planning buckets are daily as is the frequency of review. 4PLElecCo's planning parameters for the ElecCo account are summarised in table 5-6.

Characteristic	Standard cartons	Customised cartons
Planning unit	Cartons	Cartons
Horizon	12 weeks (informal)	4 weeks (formal)
Time fences	None – all fluid	Fixed – 2 weeks Slush – 2 weeks
Frequency of review	Daily	Daily
Buckets	Daily	Daily

Table 5-6: Summary of 4PLElecCo planning characteristics for the ElecCo EMEA supply chain

5.3.2.2 Source

In the context of the ElecCo EMEA supply chain, 'source' refers to the activities of the inbound logistics provider InboundCo. InboundCo has a multi-faceted relationship with ElecCo having:

- A direct relationship with ElecCo globally
- A direct relationship with ElecCo EMEA for REMEA deliveries
- An indirect relationship with ElecCo through 4PLElecCo for EU 15/2 deliveries (focus for this case study)

When ElecCo took the decision to set up an ELC for the EU 15/2 deliveries they awarded the contract to 4PLElecCo on the condition that they used InboundCo to managed the inbound deliveries. They also awarded the REMEA contract to InboundCo directly. The perceived benefit to ElecCo was sole supply for designated routes (e.g. EU 15/2 or REMEA) with the added benefit that both suppliers were intimately aware of the requirements for the piece of business that they did not have, which ensured they remained competitive. This was a conscious decision as once ElecCo was keen to ensure that they limited the control of individual players within the supply chain. InboundCo have 4PLElecCo both as a competitor and a customer which mean that…

'…the relationship has to be managed with diplomacy' (CK#7)

From a 4PLElecCo perspective, it has no choice about the inbound provider that it uses but it is in its interests to ensure that the relationship works. Equally InboundCo would

really like the 4PLElecCo EU 15/2 business but know that it needs to be seen by ElecCo to work well with 4PLElecCo to protect their inbound and REMEA business.

From a Kraljic perspective, ElecCo has taken suppliers that if used individually could be considered as strategic or critical, and by introducing the potential for substitution of services between providers, re-classified them in the leverage category, as illustrated in table 5-7.

	Non-critical or Routine	Leverage	Bottleneck	Strategic or Critical
Impact on business	*Low*	*High*	*Low*	*High*
Supply Risk	*Low*	*Low*	*High*	*High*
ElecCo positioning of logistic service providers		4PLElecCo InboundCo ←		4PLElecCo InboundCo

Table 5-7: Positioning of InboundCo on the Kraljic matrix

The danger of this relationship from an ElecCo perspective is if 4PLElecCo and InboundCo collectively accept the status quo, are content with the role that they currently play in the supply chain and are effectively a single voice in their negotiations with ElecCo. Such oligopolistic behaviour is unlikely in such an 'inbred' industry for two reasons. Firstly, there are many players in the industry, and within one year ElecCo could replace both players, and secondly, the knowledge of such behaviour would become widely known and limit their ability to win new contracts. At the time of the case the strategy appeared to be working. For EU 15/2 deliveries the InboundCo target was to ensure that 98%[77] of cartons were transferred from the nine SLCs to the ELC within 72 hours. InboundCo consistently met this target. Details of the inbound process flow from SLC to ELC are detailed in appendix 16.

In summary, ElecCo was the main decision maker in terms of sourcing strategy. It segmented the requirement firstly on routes (e.g. EU 15/2 and RMEA) and then within EU 15/2 on the process type (e.g. inbound vs. ELC and outbound). Its driver was to have the minimum number of suppliers whilst ensuring that there was sufficient competition between those suppliers for ElecCo to leverage them.

5.3.2.3 Make

Within 'make', the primary decision is to route the cartons through the appropriate processes. There are three main processes within the ELC:

1. Inbound – receipt and put away
2. Outbound – pick and ship
3. Customisation – customise and ship

The carton type determines which processes the product flows through. Standard cartons are routed through the inbound and outbound processes whilst customised cartons flow through the customisation process. For standardised cartons the aim is for cartons to be despatched from the ELC within 24 hours of receipt.

'It is not a true cross-dock facility as the cartons are not 'flowed through' but put away, and then picked and shipped as a separate operation' (CKr#4)

[77]Receipts from the Mexican SLC have an agreed target of 96 hours due to unavoidable known constraints on the route

Customised cartons are customised and shipped in line with the 4-weekly rolling plan received from ElecCo.

All processes within the ELC use the principles of one piece flow[78] and are essentially made to order (MTO). The ELC operates 5 days per week with the opportunity for overtime at the weekend. The customisation process operates one shift/day from 07:30 – 16:00, whilst the inbound and outbound processes are both two shift operations. Both start at 07:00 and end at 20:00 and 24:00 respectively. The aim of longer working hours on the outbound process is to align with haulier collection windows as part of the 'deliver' process. On average, the inbound and outbound processes deal with around 11,000 cartons/week but this can increase to as many as 36,000 cartons/week at the end of a financial quarter. The customisation process deals with an average of 5,000 cartons/week peaking at 10,000 cartons at the quarter end. Details of 4PLElecCo's three main processes are detailed in appendix 17. Key attributes are summarised in table 5-8.

	Inbound	Outbound	Customisation
Process	Single piece flow	Single piece flow	Single piece flow
Asset Utilisation	5 days 07:00 – 20:00	5 days 07:00 – 24:00	5 days 07:30 – 16:00
No. Variants	1 (Cartons)	2 (Cartons or pallets)	150 (30 base SKUs x 5 cables)
Max. Volume / week	36,000	36,000	10,000
Av. Volume / week	11,000	11,000	5,000
MTS/MTO	MTO	MTO	MTO

Table 5-8: Key attributes of the inbound, outbound and customisation processes

The number of SKUs is relatively low across all processes. The customisation process has 30 base SKUs to which one of five different cables can be added – a total of 150. The inbound process effectively deals with one SKU (the carton) and the outbound process two (cartons or pallets). However, it was when probing more deeply into the configuration of cartons for shipment that a secondary decision making criteria in the 'make' process became apparent. Whilst ElecCo tries to ensure standardisation in the way that its customers receive their orders, there has been push back from a number of tier-1 customers for a more tailored approach. These requests usually accompany large projects and include:

- Consolidation of the order in the ELC and only release when all cartons are available and personnel are confirmed to be on site
- Advance notice of despatch
- Customised paperwork
- Specific pallet configuration
- Specific date and time
- Specific equipment requirements (e.g. crane to lift to 5th floor)

Such requests cannot be dealt with as part of the standard processes and 4PLElecCo has set up a dedicated project team to deal with them. 4PLElecCo sees an increasing need for this type of service and has six tier-1 customers whose orders are managed in this way. This is a time consuming process as such services require a degree of manual intervention in what is usually an automated process. The special service also has to be

[78] Single piece flow – when items are processed and moved directly to the next process one piece at a time. Each processing step completes its work just before the next process needs the item, and the transfer batch is one.

agreed with ElecCo in advance, to enable both ElecCo and 4PLElecCo to charge a premium.

As illustrated in figure 5-9 this takes 4PLElecCo from highly standardised, relatively high volume, automated one-piece flow processes to the realms of low volume, high variety special projects.

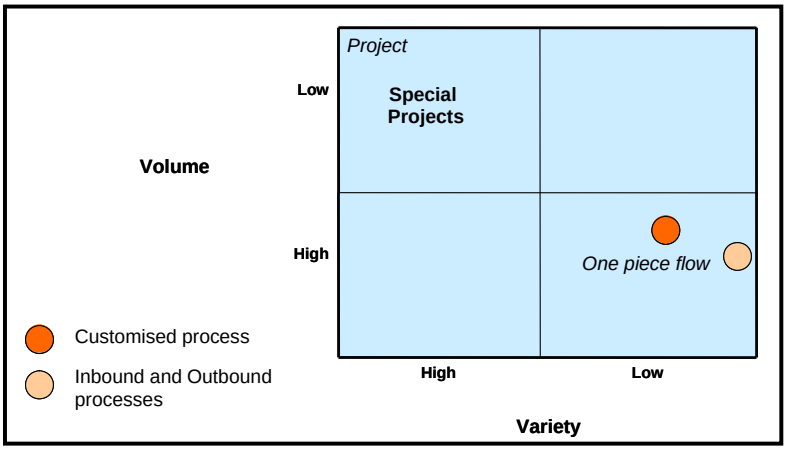


Figure 5-9: Manufacturing product: process at ElecCo

To quote the account manager from InboundCo:

'ElecCo are increasingly driving towards standardised solutions, despite the fact that some customers require customised solutions. These customers do have the option to opt out, but ElecCo need to watch the trend' (CK#7)

To conclude, the primary decision making criteria in the ELC is product type – standard or customised cartons – which in turn drives the process choice. Increasingly, a secondary form of differentiation is affecting the make processes. This is the requirement of tier-1 customers for a bespoke or special service for which they are willing to pay a premium. This was somewhat in conflict with ElecCo's strategy of standardisation, though customers do have the opportunity to 'opt out'.

5.3.2.4 Deliver

In the context of the ElecCo EMEA supply chain, the scope of the 'deliver' process is from pick up at the ELC to receipt at customer for 'opt-in' customers. This process is outsourced by 4PLElecCo primarily to three named carriers[79] with a further ten carriers being used for specialist routes. Unlike inbound carrier selection, ElecCo have not exerted their control, and 4PLElecCo has been free to select carriers as it feels appropriate. Due to the automated nature of the pick and ship process, all hauliers are pre-determined depending on:

- Service level (24 hours or 3 days)
- Type (cartons or pallets)
- Geography
- Price

[79] They collectively account for 63% of all deliveries

Hence, from a customer perspective, the primary driver of differentiation in the deliver process is service level. They use the terms Platinum service to denote delivery within 24 hours and Gold service for delivery within 3 days. The processes used by all three main carriers were very similar. The hauliers picked up their loads from the ELC at a pre-determined time between 20:00 and 24:00. The cartons or pallets had already been loaded onto containers that the hauliers left[80] on bays at the ELC. Based on average figures for the previous year's usage, it is possible for the hauliers to work out how many containers to leave and for what destinations. They also received a volume guide on a daily basis from 4PLElecCo to enable the plans to be fine tuned. Most achieved utilisation of 60-80% and could react to 2-3 hours notice should extra capacity be required. The hauliers generally used a direct feed model, which sends containers directly to the hub from which the cartons/pallets will be sorted and distributed. Platinum service cartons/pallets were fast tracked through the sorting and loading operations to be delivered; in the case of Outbound1Co by 14:30 the following day, well within the 24 hour target. Gold service product spent longer in the sorting/loading operation and would be dealt with at a time that helps balance the throughput through the hub. It was usually delivered on day 3. Indicative timings for the "deliver" process based on timings for Outbound1Co are detailed in table 4-9 and more detailed attributes in appendix 18.

Oubound1Co process	**Sales Order Type**	
	Platinum	**Gold**
	24 hours	***3 days***
Receipt	20:00 – Day 1	Day 1
Sort	22:30 – 02:30 – Day 2	Day 2
Load	04:30 – 08:00 – Day 2	Day 2
Deliver	08:00 – 14:30 – Day 2	Day 3

Table 5-9: Indicative timings for deliver process based on Outbound1Co data

Hence whilst the primary driver of differentiation in the "deliver" process is service level, the type (carton or pallet) and geography (route) are very important secondary factors as different hauliers have different specialisms and constraints. It is important for 4PLElecCo to understand these factors to ensure that they receive the best service at the most competitive price for a given service / type / route combination.

5.3.3 Overarching strategy

ElecCo had a very clear view of the way in which they wanted their EMEA supply chain to be managed, and hence the drivers of differentiation within each of the core supply chain processes. Not wanting to manage this activity themselves, but equally not wanting to be 'exposed'[81] by sub-contracting to one lead logistics provider, ElecCo carefully divided its supply chain, initially between EU 15/2 countries vs. RMEA and then for EU 15/2 a further division between inbound and ELC/outbound. Thus through their 'sourcing' decisions ElecCo divided its supply chain operations into sensible work packages that created a competitive tension between 4PLElecCo and InboundCo – their preferred suppliers. Whilst their supply chain was outsourced, ElecCo was keen to ensure that it remained in 'control'. Limiting the scope and visibility of data to the lead logistics providers was one way of achieving this.

[80] The haulier collects the filled containers and replaces them with empty ones

[81] Exposed in this context would mean an erosion of ElecCo's purchasing power due to the difficulty of finding an alternative source of supply

Customer orders from the perspective of 4PLElecCo were 'cartons'. These cartons could be standard and flow through the ELC's inbound and outbound process, or customised and be managed through the customisation process. Both processes operated on the principle of one-piece-flow but were planned differently. The customised orders had a 4-week rolling forecast and were managed using an MRP system whilst standard cartons had no formal forecasting process.

ElecCo was also keen to remain in control of the service that it offered its customers, and was keen to drive standardisation through the supply chain. Customers essentially had the option of a 24-hour or 3-day delivery time from despatch at ELC at a pre-determined price. If customers did not like these options they had the opportunity to 'opt-out' and arrange for their own collection of cartons from the ELC. 'Opt-in' customers orders were automatically routed initially based on the service level they required and then based on the delivery type (pallet or cartons) and destination. The hauliers knew which routes they served and at what service level. This enabled them to plan the distribution hub to which the order should be routed and the prioritisation of the order once it reached the hub. A summary of the drivers of differentiation within the core supply chain processes in the ElecCo EMEA supply chain is summarised in table 5-10.

Core Process		Current explicit driver of differentiation	
		Primary	Secondary
Plan		Product type (customised or standardised cartons)	
Source		EU 15/2 or RMEA	Inbound or ELC/Outbound
Make		Product type (customised or standardised cartons)	Special projects
Deliver	Customer	Opt In / Opt Out	Serice level (24 hour or 3 day)
	ELC	Service level (24 hour or 3 day)	Type (carton / pallet) and geography (route)
	Haulier network	Hub	Service level

Table 5-10: Explicit drivers of differentiation within the core supply chain processes at CleanCo

The ElecCo EMEA supply chain therefore had a very clear and well articulated supply chain strategy. ElecCo retained the bulk of decision making responsibility within the supply chain. It made the sourcing decisions, determined the service offering, and determined the approach to planning. The only decisions that remained for 4PLElecCo were how to operate the ELC and deliver processes. It also means that hypothesis HCS2:

'*Supply chain strategy is developed in response to the customer segmentation strategy'*

… is supported. Given that ElecCo was one of 4PLElecCo's top 3 accounts, 4PLElecCo was prepared to develop a fully customised solution for ElecCo. This essentially put ElecCo in a segment of one and a supply chain solution was developed that specifically met its needs. Furthermore, from an ElecCo perspective, they only chose to serve tier-1 and EAD customers, and offered them a 24-hour and 3-day service option. Whilst one may not agree that these are the correct forms of segmentation, supply chain strategy – particularly "deliver" − was developed to meet the needs of these segments.

5.3.4 Performance Measures

Sections 5.3.1 and 5.3.2 have focused on the explanation of the core processes involved in developing market segmentation and supply chain strategy. One of the areas for improvement identified from the CleanCo case was the collection of performance measures. Driven by ElecCo, 4PLElecCo had developed an integrated information system that not only supported the efficient operation of the EMEA supply chain but also provided a timely, accurate and complete data set. This in turn was interrogated at regular intervals to provide a series of Key Performance Indicators (KPIs) that were used to manage the supply chain. Once again ElecCo exerted its control on the supply chain and drove a standardised approach for reviewing the performance of all the key players[82] in the supply chain. It developed a template for vendor management based on a balanced score card (BSC)[83] approach. As illustrated in table 5-11, the focus is on a range of measures that are used to identify root causes for failure and also encourage performance improvement. Similar measures are used across the supply chain which ensures consistency and commonality of purpose. For instance, 4PLElecCo uses the same metrics and process for reviewing performance – of InboundCo (source) and Outbound1Co, Outound2Co and Outbound3Co (deliver) – as ElecCo uses for reviewing its performance.

Unit of Analysis	Key Performance Measures (KPIs)	Company Reviewed	Company Reviewing
Plan (standard cartons)	No measures	4PLElecCo	ElecCo
Plan (customised cartons)	# orders in backlog	4PLElecCo	ElecCo
Source	Apply the same metrics that ElecCo uses to assess 4PLElecCo's 'deliver' performance	InboundCo	4PLElecCo
Make	Throughput times	4PLElecCo	ElecCo
	Volume trends	4PLElecCo	ElecCo
Deliver (4PLElecCo)	Delivery performance by service level	4PLElecCo	ElecCo
	Proof of delivery performance	4PLElecCo	ElecCo
	Throughput times	4PLElecCo	ElecCo
	Case resolution performance	4PLElecCo	ElecCo
	Missed promise dates[84] (pdate)	4PLElecCo	ElecCo
Deliver (Hauliers)	Apply the same metrics that ElecCo uses to assess 4PLElecCo's 'deliver' performance	Outbound1Co, Outbound2Co, Outbound3Co	4PLElecCo

Table 5-11: Summary of Key Performance Indicators in used in the ElecCo EMEA SC

As part of their vendor management programme, ElecCo had five objectives against which they directly measured the performance of 4PLElecCo; the daily and weekly use of metrics, management by exception, completion of quarterly performance review meetings, implementation of projects for process improvement and developing links to ElecCo initiatives. As illustrated in table 5-12, 4PLElecCo performs well against all of these objectives. Daily, weekly and quarterly reviews are institutionalised across the SC. 4PLElecCo uses these data to drive improvement across the supply chain.

[82] InboundCo, 4PLElecCo, Oubound1Co, Outbound2Co and Outbound3Co.

[83] The Balanced Score Card (BSC) is a concept for measuring whether the activities of a company are meeting its objectives in terms of vision and strategy. The strategic management system helps managers focus on performance metrics while balancing financial objectives with customer, process and employee perspectives.

[84] Promise date (pdate) – the date on which a customer is promised delivery. This contrasts to request date (rdate) the date when a customer actually requests that a delivery is made.

ElecCo Objective		Evidence
1	Daily & weekly metrics	•Provided at all levels in the SC •There is a lag with some of the weekly metrics, due to delays with proof of deliveries (PODs) •Driven by 4PLElecCo / ElecCo balance score card
2	Management by exception	•Tendency to 'micro-manage', especially with new issues •'Micro-management amplification'
3	Quarterly reviews	•Carried out at all levels in the SC
4	Projects for process improvement	•4PLElecCo try to be proactive – way in which a 3PL/4PL can add value (e.g. Merge-In-Transit project) •Vendors also try to be proactive, but tends to be less scope as service is more standardised
5	Links into ElecCo initiatives	•4PLElecCo are the direct link with ElecCo initiatives •4PLElecCo manage relationships with other vendors

Table 5-12: Performance of 4PLElecCo against ElecCo's vendor management objectives

4PLElecCo even uses six-sigma[85] with its vendors to help to identify sources of variability in its processes. 4PLElecCo tries to use to the performance management system to manage issues on an exception basis. Given the transparency and visibility of information to ElecCo, it is not uncommon for ElecCo to intervene and try to micro-manage the problem. This can be very frustrating for 4PLElecCo. Another frustration for 4PLElecCo is the lack of support for SC improvement projects by ElecCo. It tries to be proactive and add value to the role as 'supply chain' manager but its efforts are frequently thwarted by ElecCo who wishes to remain in control. ElecCo perceives the projects would erode this control[86]. These and a further two issues with the performance measurement system are summarised in table 5-13.

Core SC Process	Issues with current approach to PM
Across the EMEA SC processes Deliver	Micro-management of escalated issues
	Lack of support for performance improvement projects if they are perceived to reduce ElecCo's control
	Complicated by 'co-opetition' particularly with Inbound Co due to concerns about intellectual property (IP) and loss of business
	Very transactional approach e.g. vendor selection is automated vs. other contracts with on-site implants for tenders
	Supply chain performance measured to customer promise date and not to customer request date

Table 5-13: Summary of the key issues with ElecCo's / 4PLElecCo's current performance management system

Whilst ElecCo believes it benefits from the 'co-opetition'[87] created between 4PLElecCo and InboundCo, 4PLElecCo believes it has to be balanced against the inefficiencies created as the providers are guarded about what information they share with each other. 4PLElecCo is concerned about the loss of intellectual property and hence business. It is known that:

'InboundCo have used their direct link with ElecCo to complain about 4PLElecCo' (KG#5)

[85] Six-sigma is an approach to business improvement that focuses on the reduction of variation in all work processes. Process variation results in unwanted side effects including defects and inefficient operations.
[86] One project required 4PLElecCo to have visibility of orders in the factory. This was viewed as unacceptable by ElecCo as it would have given 4PLElecCo too much information.
[87] Co-opetition is a neologism (recently created term) coined to describe cooperative competition

Arguably the most significant deficiency with the current approach to performance measurement is the focus on measuring supply chain performance against a customer promise date rather the request date. As illustrated in appendix 19, overall performance against promise date is good, with targets being consistently exceeded for the gold service and issues with the platinum service being investigated in a systematic way. There is a similar picture at a micro level where the chain performance for OptIn1Co and OptIn2Co gold service was analysed. As illustrated in table 5-14, the 98% target for on time delivery (OTD) was exceeded for both customers. 99.3% of OptIn1Co's orders, and 99.8% of OptIn2Co's orders were delivered within 72 hours of leaving the ELC. In fact Opt1Co's orders were delivered on average within 19.9 hours of leaving the ELC and OptIn2Co's within 22.4 hours. This impressive performance is calculated in relation to the date that customers are promised their orders. They are not so impressive when compared to the date when the customer actually requested the order. As detailed in appendix 20, and summarised in table 5-14, 99.3% of OptOut1Co's orders were delivered after the original request date, on average by 12 days.

	OptOut1Co	OptOut2Co
Deliver performance to 72 hour service level (SL) – target 98%		
> 72 hour SL	0.7%	0.2%
Shipped early	0%	0.5%
Mean	19.9 hours	22.4 hours
Standard Deviation	13 hours	13 hours
Promise date vs. request date		
pdate > rdate	99.3%	99.7%
Average # days	12 days	16 days

Table 5-14: Supply chain performance to OptIn1Co and OptIn2Co (Gold Service)

The situation was even worse for OptOut2Co where 99.7% of orders were delivered after the original request date and on average by 16 days. It would appear that whilst the ElecCo SC is effective at meeting the OTD targets set by ElecCo, it is not as effective at delivering what the customer actually wants.

This section concludes with a review of the supply chain's performance against the four logistics priorities for the ElecCo EMEA supply chain introduced in section 1.2.1.2.4. As illustrated in table 5-15, 4PLElecCo has had considerable success in managing the EMEA supply chain to meet these objectives. OTD is relatively accurate, predictable and visible. The network stretches across Europe and 4PLElecCo develops projects with ElecCo to reduce lead-time and cost. However, there is still room for further improvement. OTD is measured against pdate and not the more customer focused measure rdate. And ElecCo chooses to limit the opportunities for lead time and cost reduction by failing to take a more open approach to sharing demand data across the supply chain and embracing initiatives such as merge-in-transit (MIT) and cross-docking. Perhaps most telling of all is the acceptance of the end of quarter demand manipulation despite the inefficiencies it is known to create in the supply chain.

ElecCo Logistics Priorities		Supporting Evidence	Contradictory Evidence
On Time Delivery (OTD)	Predictable	•High levels of adherence to pdate + delivery lead time	•Customer confusion as to the meaning of pdate •The pdate is not necessarily the same as the request date •May be subject to change at quarter end
	Accurate	•High levels of adherence to pdate + delivery lead time •Low levels of customer complaints	
	Visible	•Track and trace for end customers	•Limited visibility for all supply chain partners of expected demand (typically 24 hours visibility) •Limited visibility of ElecCo internal SC
ElecCo delivers throughout EMEA – manage delivery of product anywhere		•4PLElecCo and InboundCo use appropriate carrier to gain access to all locations •Will make special arrangements for awkward deliveries e.g. use of crane	
Total Acquisition cost – focus on reducing all supply chain costs		•SC optimisation projects	•Cost of multiple deliveries (limited use of merge in transit) •Cost of responding to 'artificial' demand variability •Indirect holding costs (Product not flowing through SC)
Lead time reduction – remove non-value added steps		•Looking at potential for increasing direct shipment •Cross-dock project	• Product not flowing through SC •Lack of SC integration upstream beyond SLC

Table 5-15: Performance against ElecCo Logistics Priorities

5.3.5 Relationship between MS & SC Strategy

The purpose of research question CS3 was to identify the relationship that existed between market segmentation and supply chain strategy. This was further expanded by hypothesis HCS3 which stated:

'There is a direct link between customer segmentation and supply chain strategy. Different behavioural segments drive different supply chain strategies.'

The case study found that both 4PLElecCo and ElecCo segmented their customer bases on the sales value of the account. 4PLElecCo was only prepared to develop a specific supply chain solution for ElecCo because it was one of their top three accounts and accounted for more than 50% of profit for the Netherlands operation. ElecCo also had a dedicated account team as a result of their strategic status. From a 4PLElecCo perspective, the hypothesis is therefore partially accepted. Given that ElecCo is a strategic account it has a customised supply chain solution developed to meet its specific requirements. There is, therefore, a link between customer segmentation and supply chain strategy. HCS3 would be rejected on the grounds that it was account value and not behavioural segmentation that drove this strategy.

ElecCo used account value to help it determine if customers would be classed as vertical or channel customers. Vertical or tier 1 customers were the top 100 service providers by sales value who purchased high-end equipment for which they were willing to pay a premium. All other customers had to buy ElecCo products either from an ElecCo distribution partner (EDP) if they were a tier 2 customer or through an ElecCo authorised dealer (EAD) if they were tier 3. In terms of supply chain strategy ElecCo only delivered product to tier 1 customers and EDPs. Both were offered the opportunity to 'opt-in' and use the ElecCo delivery service or 'opt-out' and arrange their own. 20% of customers chose to do this which would suggest that there were some deficiencies in the ElecCo service proposition. When interviewed OptOutCo cited four reasons for choosing to opt out:

1. Greater visibility and control
2. For high value orders it is more economical − logistics costs are calculated on a weight basis and this is significantly cheaper than the ElecCo system where they are based on a percentage of sales value
3. Increased scope for customisation − ElecCo driving for standardisation vs. customers requirement for increased customisation
4. Improved transit time

4PLElecCo is aware of a number of these issues and has suggested solutions to ElecCo. Visibility and control could be improved if ElecCo were willing to remove the artificial divides that it imposes in the supply chain. 4PLElecCo has set up a dedicated team to deal with the customisation requirements of the tier 1 customers. Each requirement is dealt with on a case by case basis and the service offering and price have to be agreed by ElecCo before being offered to the customer. To date six customers have used the service for which they pay a premium. 4PLElecCo has identified opportunities to reduce the transit times by using merge-in transit and cross-docking techniques but ElecCo appears reluctant to adopt them.

Sources from across the supply chain have emphasised ElecCo's drive for standardisation despite customers' increasing desire for customised service options. The platinum (24 hours) and gold (3 day) service option is somewhat arbitrary and the standard industry differentiation. The 'deliver' process is totally aligned to this proposition but significant questions remain about whether this is what the customer really wants? From an ElecCo perspective, the hypothesis would also be partially rejected on the same grounds as for 4PLElecCo. There is a link between customer segmentation and supply chain strategy from a channel strategy perspective. ElecCo only provides product directly to its tier 1 and 2 customers and the 'deliver' processes are well aligned to support the platinum and gold service offered to its opt-in customers. The hypothesis is partially rejected because once again this is not driven by behavioural segmentation. There is also evidence that ElecCo's standardised service offerings do not align well with the increasingly bespoke requirements of its customer base.

In summary, HCS3 is partially supported. This is because there was evidence to support the link between customer segmentation and supply chain strategy, but rejected as it found that account value and not buying behaviour drove this strategy.

5.4 Underlying Mechanisms

Section 5.4.1 begins with a review of contextual factors that may drive the development of CRSC from both an internal and external perspective. Section 5.4.2 is more introspective and focuses on the identification of 'root causes' that, depending on context and/or use, enable or inhibit CRSC strategy.

5.4.1 Contextual factors

There were five contextual factors identified during the CleanCo study that impact on the development of CRSC strategy: globalisation; outsourcing; fragmentation; relative size; and, market polarisation. CleanCo was a company that came from a heritage of vertical integration and these factors, whilst creating new business opportunities, also challenged CleanCo's existing business model. In contrast, whilst these factors are also

pertinent to the ElecCo EMEA supply chain, they were key drivers of the business model. Each of these factors and an additional factor – global economic cycles – is discussed in turn. The impact of each factor is summarised in table 5-16.

Contextual Factor	Impact	Potential Upside	Potential Downside
Globalisation	Business model developed to reflect the global nature of the business	Leverage the benefits (scale & scope) of being a global player	Constraints in certain supply routes increase the lead time
Outsourcing	Integral part of the global business model	Strategy for achieving global reach in a relatively short time frame.	Supply chain is not as efficient as it could be.
Fragmentation	Increased demand for customised services	Develop customised services (special projects)	Dilutes the effectiveness of the current business model which is driven by standardisation
Relative size	ElecCo is a prestigious global account	Benefit from their size in negotiations with other SC players	Lose touch with reality
Market polarisation	Both ElecCo and 4PLElecCo only deal with 'high end' customers	Focus	Missed business opportunities
Global economic cycles	The upturns are large, but demand can drop away overnight	Make super normal profits during the upturns	Obsolete stock during downturns

Table 5-16: Summary of key contextual factors and their impact on the ElecCo EMEA SC

5.4.1.1 Globalisation

From the outset, ElecCo developed a business model that was global in nature. This enabled ElecCo to benefit from the scale and scope of its global operation. Product is sourced globally whilst customers and their deliveries are managed regionally. From the perspective of the EMEA supply chain this means that the majority of product is produced around the globe and shipped from SLC to the ELC ideally within 72 hours. One negative impact of globalisation is the strain that is put on the air freight infrastructure in certain countries. Due to high demand relative to capacity, Mexico and Malaysia (Penang) have known constraints which make it difficult to reliably meet the 72 hour target. This has meant that the lead time from these sources has been increased and the target increased to 96 hours.

4PLElecCo was set up in the early 1990's to provide supply chain solutions to global customers. Its business model reflects the structure of many of its customers with accounts – such as that of ElecCo – being managed both regionally and globally. 4PLElecCo also enjoys the benefits of exploiting its global scale and scope.

5.4.1.2 Outsourcing

An integral part of ElecCo's global strategy is outsourcing. It is a strategy that ElecCo used to help them achieve global reach in a relatively short period of time, whilst reducing their financial exposure to economic upturns and downturns. As discussed in section 5.3.2.2, ElecCo has carefully selected a combination of two providers to manage its EMEA supply chain. Initially they were selected for their ability to provide a 'one stop shop,' but ElecCo created a degree of co-opetition between the providers and created a 'two stop shop'. This reduced ElecCo's dependence on an individual provider and enabled them to retain the upper hand. The potential downside is that the supply chain is not as efficient as it could be: a more open approach would make it easier to further reduce supply chain costs and lead time.

The EMEA SC can be reviewed as a cascade of outsourcing opportunities. 4PLElecCo and InboundCo both outsource transportation activities to third parties for similar reasons to ElecCo. Outsourcing is also particularly prevalent in Europe, where the provision of logistics and transportation services is fragmented.

5.4.1.3 Fragmentation of Demand

ElecCo's business model was developed on the principles of process standardisation, which has limited the service offerings to customers of the EMEA supply chain. Customers are increasingly demanding more customised solutions. 4PLElecCo is responding to this demand through the provision of a special projects team. This has the benefit of retaining those customers and informing 4PLElecCo of customer trends which could help with the development of new standard service propositions but it conflicts with ElecCo's drive for standardisation and could undermine the principles upon which the supply chain has been designed and developed.

5.4.1.4 Relative Size

ElecCo is an attractive account for lead logistics providers. It is a high value account with a global presence. ElecCo know this and uses its size to its advantage in negotiations. It prefers to deal with other 'global' players that mirror its own global/regional approach. ElecCo is also quite a controlling company and has a tendency to be directive. ElecCo needs to be careful that it does not abuse its position of power, assumes that it always knows best and loses touch with reality. There is evidence from the case study where suggestions from 4PLElecCo have been dismissed (e.g. merge-in-transit, cross-docking) despite obvious business benefits. There is also evidence of ElecCo's failure to understand the service requirements of its customers despite professing that:

'Everything ElecCo does is focused on increasing customer satisfaction' (EdB#2)

5.4.1.5 Market Polarisation

ElecCo and 4PLElecCo have made a conscious decision only to deal directly with customers at the 'high end' of the market. This focused business strategy is reflected in a focused supply chain strategy and enables ElecCo to offer its customers a superior service at a premium price. With 20% of customers choosing to 'opt out' there are some customers for whom the service does not justify the premium. As commented by the 4PLElecCo customer services manager:

'There will always be customers who choose to 'opt out' but we need to understand why, and decide if their business is worth pursuing' (CH#6)

5.4.1.6 Global Economic Cycles

ElecCo provides equipment to the telecommunications industry, a sector that is sensitive to global economic cycles. In 2002, ElecCo was still reeling from the massive downturn in demand following the burst of the 'dotcom bubble' in 2000. ElecCo had been particularly badly affected as it had had to write off millions of pounds of obsolete inventory, and had seen the value of its shares fall to a third of their peak value. Those in the industry are aware that it is cyclical in nature. The challenge is to make super-normal profits during the 'booms' and cover costs during the 'busts'.

5.4.2 Enablers and Inhibitors

As mentioned in section 4.6.5, the intention when dealing with the enablers and inhibitors was to use the frameworks developed during the CleanCo analysis as a starting point for this case. The first step was to identify the raw factors from the case analysis. The next step was to consider the type of alignment that the factors affected and whether the impact was positive or negative. As summarised in table 5-17 alignment was commonplace in the ElecCo EMEA supply chain. The analysis was completed from the perspective of 4PLElecCo as the supply chain 'manager'. The end to end alignment of the supply chain was exemplary. The supply chain responded in a synchronised way to the demand that ElecCo placed upon it. Spare capacity was used to buffer against uncertainty and the supply chain could respond with 2-3 hours to uplifts in demand. This was enabled by an integrated information system that provided timely and accurate information, and was made possible as all parties were disciplined and understood the importance of adhering to the standardised processes. There were some minor issues (e.g. lag with some metrics due to issues with PODs) but generally the system worked very well. There was also a standardised approach to performance management across the supply chain based on a BSC approach. This drove a series of daily, weekly and quarterly reviews across the chain. The KPIs enabled the supply chain to be 'managed by fact'[88] and were analysed to identify root cause problems and drive continuous improvement. The main inhibitor to end-to-end alignment was the visibility of supply chain data. The system had the ability to provide end-to-end visibility, but ElecCo chose to create artificial divides which typically limited visibility to 24 hours.

Internal alignment was also very good. The 4PLElecCo team was a small team who were co-located in a dedicated facility. All members had a high level of supply chain expertise and were committed to making the ElecCo account a success. The main areas for improving alignment predominantly concerned relationships. The decision by ElecCo not to involve 4PLElecCo in the selection of the inbound provider – InboundCo – was a source of tension. Although all parties tried to act in a professional way and ensure the success of the relationship, this is difficult when they are essentially competing for the same business. This contrasts with the excellent relationship that 4PLElecCo had with the hauliers whom they were able to select themselves and were not direct competitors. A potential inhibitor was the method used to select hauliers for individual routes. It was very transactional and was in stark contrast to the more relationship based use of implants on other accounts. 4PLElecCo generally had a good relationship with ElecCo. Their regional and global structures mirrored each other which enabled effective account management. The size and strategic importance of the account enabled 4PLElecCo to develop a customised solution for ElecCo and the dedicated account teams worked together to ensure its success. Friction only seemed to enter the relationship when ElecCo appeared to inappropriately use its power.

[88] 'Manage by fact' is an approach to problem solving that is supported by the advocates of lean manufacturing

Alignment Type		Status	Enabling Factors	Inhibiting Factors
Strategic alignment		😐	• Clearly defined logistics priorities • Clearly defined channel strategy • Business focused	• Practices that contradict logistics priorities (see table 5-15) • Preoccupation with stock market leads to demand manipulation at quarter end
Internal alignment		☺	• Small dedicated team • High degree of technical expertise • Co-located in a dedicated purpose built facility	
External alignment	ElecCo	😐	• Both companies have a regional and global structure • Customised solution for the ElecCo contract with dedicated team • 4PLElecCo is very customer focused	• ElecCo is extremely cautious (e.g. couldn't include tier 1 customers in case study) • ElecCo has a tendency to micro-manage • Not invented here syndrome – ElecCo is reluctant to accept projects proposed by 4PLElecCo
	Customers	😐	• Clearly defined customer service levels • Focus on increasing customer satisfaction	• ElecCo is the voice of the customer, but doesn't actually ask its customers what they want • Cost of service calculated on order value which has no bearing on logistics costs • Customers increasingly request a customised service • SC performance measured in relation to pdate rather than rdate
	InboundCo	😐	• Professional relationship	• Co-opetition • Inbound provider 'forced' upon 4PLElecCo and they were not part of the decision making process
	Hauliers	☺	• Automated haulier selection is very efficient • Excess capacity (network & people) • Responsive • Selected by 4PLElecCo • Use of track and trace to provide visibility of customer orders	• Very transactional approach to haulier selection mandated by ElecCo
End to End SC alignment		☺	• Synchronised • Disciplined • No inventory (standard cartons) • Excess capacity (network & people) • Standardised processes • Integrated information system that provides timely and accurate information • Standardised approach for performance management • Standardised approach for vendor management based on the BSC • Focus on root cause identification and develop projects for continuous improvement • Clearly defined vendor management objectives • Manage by fact • Exception management	• Limited visibility of demand across the SC (ElecCo limits the visibility of any one party to 24hours before receipt) • Lag with some metrics due to delays with PODs

Table 5-17: Enablers and Inhibitors to the alignment of the ElecCo EMEA supply chain managed by 4PLElecCo

ElecCo had a tendency to micromanage escalated issues, and was not receptive to performance improvement projects that were not its own ideas. It was also slightly cautious. For instance, ElecCo would not allow us to include tier-1 customers in the case study for fear that it would raise their expectations in a way that could not be fulfilled.

This may be a valid concern, as whilst ElecCo professes to be customer orientated and has clearly defined levels of customer service, this is based on an ElecCo perspective of what customers need. Customer alignment is inhibited by the current approach of calculating logistics costs on sales value. This approach has no direct bearing on the actual logistics cost and penalises customers with large orders. It is also inhibited by measuring supply chain performance against pdate rather than rdate. Hard evidence of this misalignment is provided by the 20% of customers who chose to opt out, the increased requests for customised services, and ElecCo's willingness to manipulate demand at the end of financial quarters. Whilst business focus is an enabler to strategic alignment, when it becomes an overplayed strength, it can become an inhibitor. As is the case with ElecCo's fixation with stock market reporting. There is potential for good strategic alignment as ElecCo has a clearly defined set of logistics priorities and a channel strategy which is openly shared with 4PLElecCo. Whilst there is evidence to support the pursuit of these objectives, contra-evidence also exists (see table 5-15) driven by the previously mentioned factors that inhibit the 4PLElecCo – ElecCo relationship.

The next step in the analysis was to categorise the factors identified in the enabler and inhibitor analysis as artefacts, mechanisms or assumptions and create a culture map as illustrated in figure 5-10.

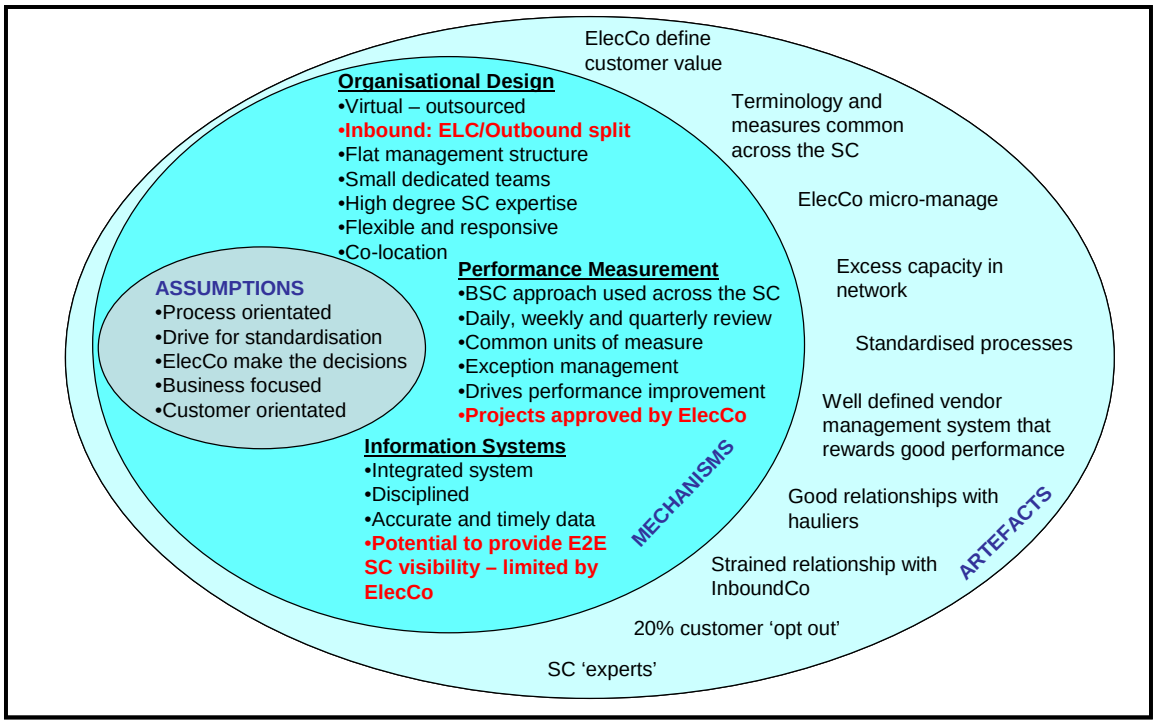


Figure 5-10: ElecCo EMEA SC managed by 4PLElecCo – Levels of Culture (after Schein (1992))

At the heart of the ElecCo EMEA supply chain are embedded assumptions about the way that the supply chain operates. These are based on a standardised-process orientated way of thinking that cuts across organisational boundaries. They seek to be customer responsive yet are balanced against the realities of delivering shareholder value. It is clear to all involved that ElecCo is the key decision maker and its word is final. A broad range of artefacts provide the visible manifestation of this largely positive paradigm whilst hint at its limitations. The crucial link between the assumptions and artefacts is the mechanisms. The mechanisms are the same as in the CleanCo case study but the way they have been used is very different. Each of the three mechanisms (organisational design, performance measurement and information systems) is supported by factors which are largely enabling. In each case there is one factor that has an inhibiting effect and these factors are identified in red in figure 5-10. The common thread between these inhibitors is ElecCo's desire to exert control. ElecCo used its control and desire to leverage its power to nominate InboundCo as the inbound provider without consulting 4PLElecCo. And ElecCo used its control to reject projects and limit the visibility of demand data even though they would have helped to improve the performance against the logistics priorities. It is a fine balance and there may be broader issues not uncovered by the case study that explain these actions. However, the consistency of ElecCo's behaviour suggests this factor may be part of the culture within ElecCo and unfortunately it is not a factor that fits well in an end-to-end supply chain.

5.5 Potential for Improved Customer Responsiveness

Both 4PLElecCo and ElecCo chose an account value based approach to customer segmentation. Given that ElecCo was one of 4PLElecCo's top 3 accounts it was prepared to develop a fully customised solution for 4PLElecCo. This essentially put ElecCo in a segment of one and a supply chain solution was developed that specifically met their needs. 4PLElecCo developed the supply chain solution based on ElecCo's perception of what its customers valued. It is questionable if ElecCo ever asked its customers what they would actually like but based the service offering on what it was willing to offer to them. Only the 100 largest tier-1 customers and the 7 nominated ElecCo Distribution Partners had direct access to ElecCo. They were all offered the same level of service – Platinum and Gold – and the pricing for these services was based on a percentage of the total order value. ElecCo had not conducted any research to find out if the differentiation between a 24-hour and 3-day service was meaningful to their customers, and refused access to tier-1 customers to ask their opinion. Indicators that this may not be the most relevant approach to differentiate service offering include:

- 20% of customers opt-out
- Increase in requests for customised services
- All parties in the supply chain are aware of the increased desire for customised service

Insight in terms of an alternative approach to developing a more CRSC strategy was provided by OptOutCo. As illustrated in table 5-18, three of the four factors identified – factors 1-3 – have relatively simple solutions that could be considered as process enhancements to the current supply chain strategy. It is reason 4 that has further reaching implications for supply chain strategy.

	Reason for 'Opting Out'	Potential Solution
1	Increased visibility and control	Remove artificial barriers in current system
2	Not economically viable for large orders when logistics costs are calculated on a % sales value (the norm is by weight / volume)	Develop a tariff based on weight/volume
3	Improved transit times	Implement merge-in-transit and cross-dock projects as identified by ElecCo Work to rdate not pdate
4	Increased scope for customisation	Understand customer requirements for customisation and develop standardised portfolio of options

Table 5-18: OptOutCo reasons for 'opting out' and potential solutions

Part of the success of the ElecCo EMEA supply is its process standardisation. To accept a broad range of customisation requirements in an unstructured way could undermine the fundamental principles upon which the current supply chain is built. As an interim solution 4PLElecCo has developed a special projects team to deal with customisation requests. The team responds in an *ad hoc* way to customer requests and it is a resource-consuming process, which is not viable at higher volumes. The benefit is that it does provide detailed insight into emerging customer requirements and could help to shape service offerings of the future.

The potential exists for a three-pronged approach to the logistics services ("deliver") 4PLElecCo offers to its customers, as summarised in figure 5-11. ElecCo could continue to offer a range of standard services to its customers. These could be based on the existing gold and platinum services but could be enhanced by adopting the process enhancements mentioned before and using the most appropriate differentiation in lead time.

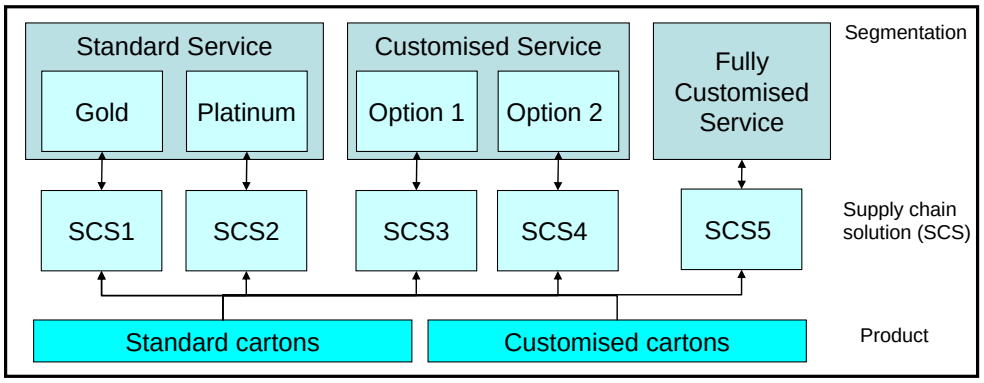


Figure 5-11: Potential for improving customer responsiveness in the ElecCo EMEA SC

The second strand of service offerings would be a limited range of customised services. Based on analysis of the most common requests for customisation – a number of pre-defined customer services could be developed[89]. The final strand would be to continue the work of the special projects team to deliver fully customised solutions. This could act as a mechanism for keeping the standard and customised services refreshed. All three strands would need to be driven from an analysis of customer needs obtained through direct customer conversations attended by 4PLElecCo and ElecCo. As with the current 'deliver' process it would be able to deal with either standard or customised cartons through any of the proposed supply chain solutions.

[89] This analysis was beyond the scope of the studies for this thesis but was recommended to 4PLElecCo as a potential performance improvement project.

5.6 Chapter Summary

The primary purpose of this core case was to provide data to address the six research questions. In terms of addressing the descriptive 'what' research questions CS1 and CS3 it was found that both 4PLElecCo and ElecCo use account value as the primary means of customer segmentation. 4PLElecCo only had 10 client accounts, of which the top 3 were termed 'strategic'. ElecCo as a strategic account was assigned its own dedicated account teams who developed their customised supply chain solution. There was therefore a high degree of connectivity between the segmentation strategy and supply chain solution. The supply chain solution was developed by 4PLElecCo driven by ElecCo's channel and service strategy. ElecCo only dealt directly with its 100 largest tier-1 suppliers and 7 EDPs. Tier-2 customers had to deal with the EDPs, and tier-3 customers the EADs (who received their product from the EADs). ElecCo offered tier-1 and EDP customer's two different service offerings (24 hour or 3 days) which essentially drove differentiation into the 'deliver' part of the supply chain. The supply chain solution developed by ElecCo was based on an outsourced model. It was a holistic and aligned supply chain solution from SLC to customer. Whilst the management decisions varied for each of the core supply chain processes, there was alignment between them. The key issue was that ElecCo determined the service levels independently from the customer. The supply chain was aligned to ElecCo's perception of customer value and not what the customer actually wanted. This resulted in 20% of customers opting out and an increasing number of customers requesting customised solutions.

Two hypotheses underpinned research question CS1. The first HCS1 was not supported as customers were not segmented based on buying behaviour but in terms of account value. HCS2 was upheld as ElecCo could be considered as a segment of 1 customer for which a customised supply chain solution was developed. In addition, this solution was developed in response to ElecCo's channel and service strategy. Whilst one may argue that this was not the most appropriate means for segmentation the supply chain strategy was developed in response to it. This links into HSC3 which underpinned research question CS3. This was only partially accepted. It was accepted as there was a direct link between segmentation and supply chain strategy, but rejected as it was not driven by buying behaviour.

In addressing the explanatory 'why' questions CS2 and CS4 the four contextual drivers originating from the CleanCo case were also found to apply to this case. The key difference was that ElecCo and 4PLElecCo used these contextual drivers proactively to drive their new and somewhat 'virtual' business models, whilst CleanCo with its established vertically integrated supply chain had to react to them. An additional factor – global economic cycles – was also identified by this case. Evidence was also found to support the three mechanisms identified in the CleanCo case. In CleanCo the application of these mechanisms had an inhibiting effect on alignment, whilst in this case the effect was generally very positive. ElecCo's desire to maintain control was a common link between the inhibiting factors. It had driven artificial divides in the structure of the supply chain which limited the visibility of data both within the supply chain and to the customers it served. ElecCo also used its authority to veto projects originating from 4PLElecCo designed to improve performance against ElecCo's stated logistics priorities.

Research questions FP1 and FP2 were focused on the future potential for improved customer responsiveness in the ElecCo EMEA supply chain. Potential did seem to exist with the opportunity to segment customers based on a more developed understanding of what was actually needed from the supply chain. Segmentation would still be based on service propositions but would cover standard services (a developed version of the existing Gold and Platinum services), fully customised services (equivalent to the current special projects) and a new segment of customised services which would offer customers a limited range of customisation options that could be delivered in a standardised way.

The 4PLElecCo core case has built on the learnings from the CleanCo case, and has started to identify some interesting similarities and differences for consideration in chapter 7 – cross-case analysis. Before that, however, further evidence is presented in chapter 6 - core case 2 – PharmaCo.

6 Core Case 2 – PharmaCo UK

6.1 Introduction

The structure for this case is a mirror of the 4PLElecCo study presented in chapter 5 and is summarised in figure 6-1 below. It begins with an overview of the research context in section 6.2, before presenting the main content and outputs in section 6.3 and underlying mechanisms in section 6.4. Based on this analysis the potential for improved customer responsiveness is explored in section 6.5 before the chapter is brought to a close with a summary in section 6.6.

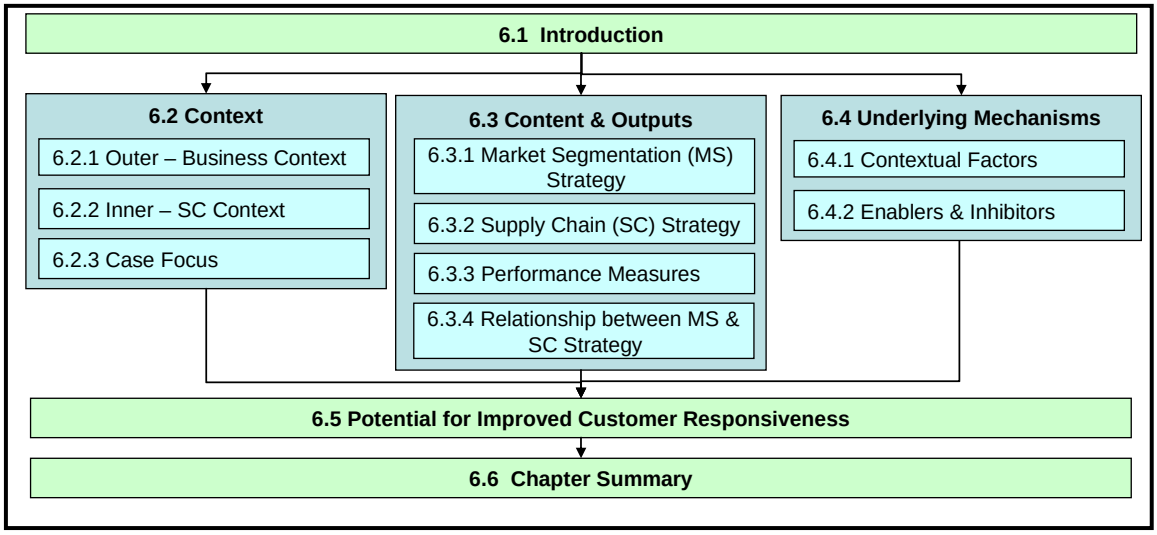


Figure 6-1: Structure for Chapter 6 (Core Case 2 – PharmaCo)

6.2 Context

Data were primarily gathered during the scoping study. Their purpose is firstly to present the contextual factors which may impact the development of CRSC strategy, and secondly to identify the focus for the main study. The data are presented in three main sections: 6.2.1. Outer- Business Context, 6.2.1 Inner- Supply Chain Context and 6.2.3 Case Focus.

6.2.1 Outer – Business Context

The outer business context covers two main elements; section 5.2.1.1 provides background on the parent company PharmaCo PLC whilst 5.2.1.2 gives a more detailed overview of PharmaCo UK in terms of its products and structure (5.2.1.2.1), competitors (5.2.1.2.2) and customers (5.2.1.2.3).

6.2.1.1 PharmaCo PLC – The Parent Company

At the time of the case study in late 2003, the objective of PharmaCo PLC was:

'…to become the global leader in health and beauty' (company fact file 2000)

In pursuit of this objective, PharmaCo PLC employed over 75,000 people and operated in 130 countries worldwide. PharmaCo PLC returned to its retailing roots after a brief and unsuccessful attempt to stretch their brand into high margin healthcare and beauty services. As illustrated in figure 6-2, PharmaCo PLC has restructured the organisation to focus on a single company with two core businesses: PharmaCo Retail and PharmaCo Medical. Group turnover in 2003 was £5.1 billion.

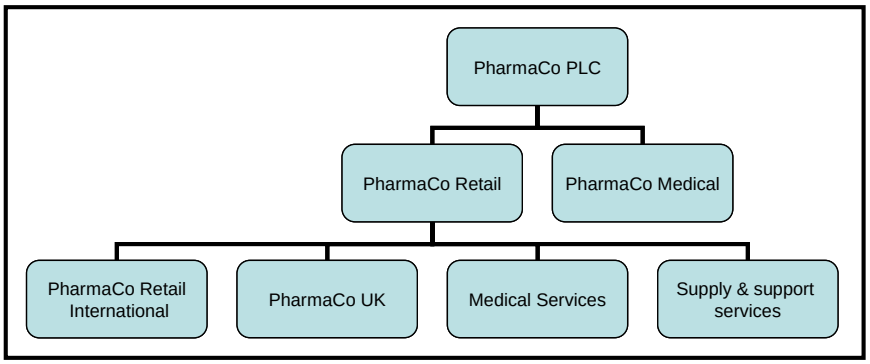


Figure 6-2: Position of PharmaCo in PharmaCo PLC Divisional Structure

PharmaCo Medical produces a range of branded over the counter (OTC) medical and beauty products which it sells across the world. PharmaCo Retail has four main business units; an international retailing operation (PharmaCo International), a UK retailing business (PharmaCo UK), a medical services business (Medical Services) and centralised support services (Supply and Support). The focus for this case study was the strategically important UK retailing operation, PharmaCo UK. It is at the heart of the company and in 2003 had a sales turnover of £4.3 billion – 84% of group turnover.

6.2.1.2 PharmaCo UK

PharmaCo UK (which will now be referred to as PharmaCo) is the UK's leading retailer of health and beauty products. PharmaCo employs over 54,000 people and operates a network of almost 1,500 stores across the UK ranging from small community pharmacies to city centre department stores. The origins of PharmaCo date back to the mid 19th century with a 'pile high, sell cheap' philosophy. This changed towards the end of the 19th century when the vision was for PharmaCo to be the 'largest, best and cheapest'. This objective has largely been achieved and in 1993 PharmaCo stores had the second highest footfall in the UK after the post office.

6.2.1.2.1 Customers

The PharmaCo customer base is very broad and one in three UK residents shop in a PharmaCo store every week. PharmaCo has a loyalty card – The PharmaCo card – which gives its customers the opportunity to build up points to redeem against the full PharmaCo product range. It was the first loyalty card from a UK retailer to use smartcard technology, the purpose of which was to provide a deeper understanding of customer needs. At the time of the case, over 11 million cards were in use with over 40% of sales linked to a card.

6.2.1.2.2 Stores

Over 85% of PharmaCo stores are in towns and city centres. The remainder are in suburban shopping centres, health centres, airports and railway centres. The largest store is 4,400 m^3 and the smallest 16.5 m^3. The store network covers the majority of the UK, stretching from the Orkney and Shetland Isles in the north to the Channel Islands in the south. Stores are segmented in three ways; sales area group, format and geographical region. There are 18 sales area groups which are determined based on stores sales turnover. A1, A2, and A3 are the three smallest groups and F1, F2 and F3 are the largest. The second basis for segmentation is format. This includes categories such as large destination stores, small and travel. The third is geographic region which has three levels. There are eight regions, under which sit 26 customer areas. Beneath this sits a hub and spoke system. As illustrated in figure 6-3 this is comprised of the nomination of a large hub store from which the requirements of smaller spoke stores are co-ordinated.

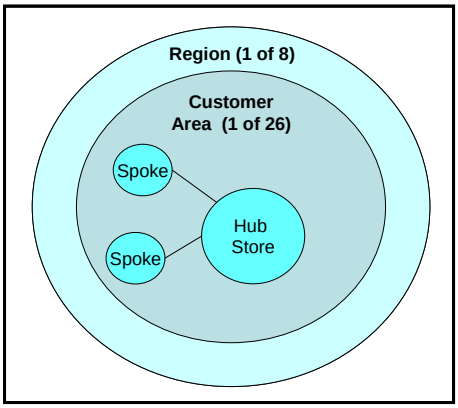


Figure 6-3: PharmaCo store segmentation

Store size – measured in m^3 – is used to drive the hub and spoke designation. Store segmentation is an important part of the PharmaCo retailing strategy as it drives range decisions.

6.2.1.2.3 Products and services

PharmaCo sells a broad range of products. The primary classification of its product range is between: health and beauty, photo, food and baby, and non-core categories. The sales split between these categories is summarised in table 6-1.

Category	% sales (value)
Health and beauty	77.5
Photo, food and baby	16.6
Non core categories	5.9

Table 6-1: PharmaCo sales split by category (2003)

Health and beauty has three main sub-divisions: dispensing[90], OTC medicines and beauty. Whilst PharmaCo is the market leader in both OTC and beauty, it is dispensing that forms the focus for the case study. This is because:

'…Pharmacy remains the cornerstone of our business' (company fact file 2000)

[90] Dispensing is a term used to describe the process of administering prescription medicines

Dispensing represents around 25% of PharmaCo's total sales. PharmaCo dispenses over 85 million items per year. This is equivalent to dispensing nine items every second of each working day. PharmaCo employs over 4,000 pharmacists and supplies medicines to a wide customer base, including a quarter of all nursing and residential homes in the UK.

6.2.1.2.4 Competition

The UK government strictly regulates the number of pharmacies present in the UK. Through the 360+ primary care trusts they issue licenses to dispense. The pharmacy market is broadly split into three categories: independent, specialist and in-store. Independent pharmacies, as their name suggests, are the small privately owned pharmacies. Specialist pharmacies are chains of pharmacies, such as PharmaCo. In-store pharmacies are based within the stores of large grocery retailers. Retail competition continues to intensify. The major grocery multiples have continued their expansion of in-store pharmacies, thus contributing to the reduction of the independent pharmacy sector. As not only the grocery multiples, but also specialist multiples, chase independent pharmacies and their NHS dispensing contracts, the independent sector is shrinking. As illustrated in table 6-2, in 2000, PharmaCo had the largest number of pharmacies in the UK. This was approximately 100 pharmacies more that its nearest rival.

Retailer	Number of UK Pharmacies	
	1997	2000
PharmaCo	1,258	1,409
Specialist 2	1,463	1,300
Specialist 3	705	711
Specialist 4	459	707
Specialist 5	238	279
Specialist 6	59	125
Instore1	568	764
Instore2	370	473
Instore3	378	432
Instore4	206	240
Total	**5,704**	**6,440**

Table 6-2: Pharmacy numbers, 1997 & 2000 (Mintel)

As demonstrated by the following quotes from a Mintel[91] intelligence report, PharmaCo's main strengths are its size, heritage and reputation. Its main threat is from the growth of in-store pharmacies.

'The strength is in numbers. That's why PharmaCo have done so well. It's larger buying power, and they make more profit, and they are buying the independents out.' (Pharmacy buyer, grocery multiple)

'It's a double-edged sword to them, their reputation and heritage. You know you can go to Boots and the advice will be sound. People have confidence in their pharmacy operation and their healthcare. But their heritage makes them slow to react to things and a bit arrogant when dealing with suppliers and the industry.'
(Development manager, specialist multiple)

[91] Mintel Report , OTC/Prescriptions Medicines Retailing - UK (December 2000)

6.2.2 Inner – Supply Chain Context

At the heart of the PharmaCo supply chain is the dispensing warehouse which is co-located on a site in the Midlands with six other PharmaCo central warehouses. The central warehousing system was set up in 2002 as part of a major infrastructure review which saw the closure of two regional sites. This also meant that the dispensing warehouse was co-located on the same site as the trading, and supply and support services teams. From the perspective of the dispensing supply chain, the main activities carried out by the trading function were commercial management and clinical governance. As illustrated in figure 6.4, commercial management focused on 'buying' the required medicines and making pharmacy location decisions. The main activities of the supply and support function related to operations. For dispensing, this focused on logistics (warehouses and transportation) and supply planning.

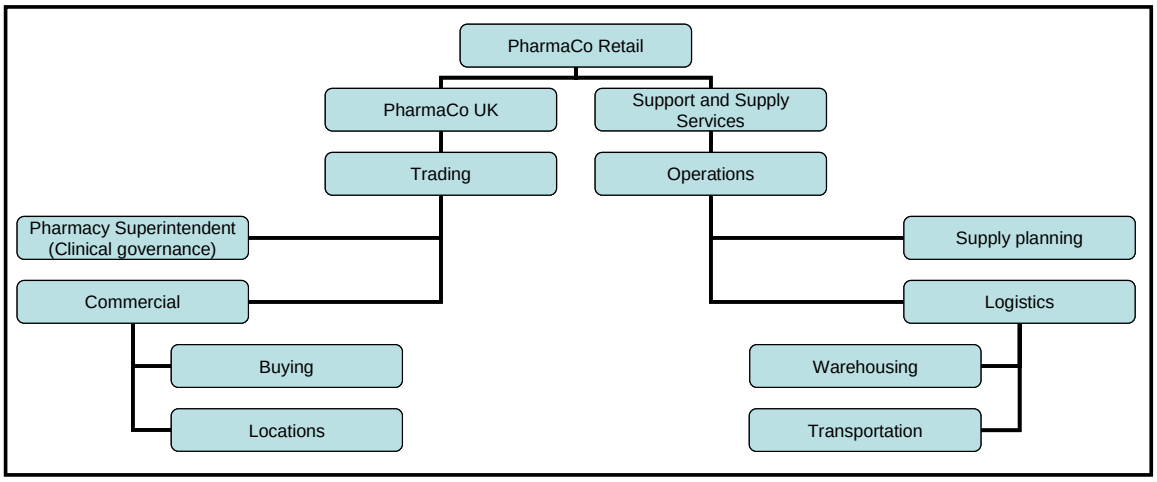


Figure 6-4: Role of trading and operations in relation to the dispensing supply chain

The buying team essentially negotiates the deal with the pharmaceutical suppliers, of which there are around 200. PharmaCo has a preferred inbound logistics provider, MedLogCo, who they encourage their suppliers to use. Uptake is around 25%. It is the responsibility of the supplier and their nominated inbound haulier to obtain a booking slot. Unlike the supermarkets, if this slot is missed PharmaCo generally still accepts the load. The supply team work closely with the buying and logistics teams to ensure availability of product across the supply chain at minimum cost. To quote a dispensing supply manager:

'The supply role is a more withdrawn role and I see it more as stakeholder management in terms of liaising with people like the warehouse manager, buying teams and pharmaceutical superintendent's office' (TG#7)

The PharmaCo dispensing supply chain only provides its pharmacies with the top 1,800 lines[92] on a daily basis. ChemCo provides the stores with all other standard products and acts as a secondary source for the top 1,800 lines. In contrast to PharmaCo, ChemCo delivers twice daily. About 1% of all prescriptions (scripts) received are for special products which are non-stock items and procured as required by the supply team.

[92] This had recently changed. It used to be the top 3,200 lines. However there was commercial benefit in extending the range of products supplied by ChemCo.

PharmaCo has outsourced the management of outbound logistics activities to TruckCo. It had recently changed its outbound haulier as the previous provider could not adhere to PharmaCo's strict store delivery schedule. Dispensing products are packed into specialist containers which are cross-docked overnight through the network of 17 RDCs before being delivered to the 1,428 PharmaCo stores by mid-morning. The top level dimensions for the PharmaCo dispensing SC are summarised in table 6-3.

Source	Make	Deliver	
Pharmaceutical suppliers 200 ***Inbound logistics*** MedLogCo	***Dispensing Warehouse Stock Keeping Units*** 1,800 highest volume items ***MedCo Warehouse Stock Keeping Units*** 18,000+ lower volume items + back-up service for top 1,800	***Distribution Centres (DCs)*** 17 *Hauliers* TruckCo	***Stores/Pharmacies*** 1,428 ***Customers*** 1 in 3 members of UK residents visit a PharmaCo store each week

Table 6-3: PharmaCo Dispensing Supply Chain – Top Level Dimensions

6.2.3 Case Focus

The PharmaCo case study was focused on the dispensing supply chain which represents 25% of PharmaCo's total sales. It is a supply chain that provides over 20,000 different SKUs within 24 hours to over 1,400 stores across the UK. From a SCOR® perspective the 'make' activity is the operation of the dispensing warehouse. Source, is PharmaCo's 'buy' function that negotiates the deals with pharmaceutical suppliers, which includes the role of MedLogCo as the preferred inbound carrier. On the deliver side, the focus was on the cross-docking operation of the DC, and the interaction with the stores. Whilst the study did consider the ChemCo supply chain, this was from the perspective of the service that they offered to PharmaCo. It was not possible to conduct interviews directly with ChemCo. Equally it was not possible to access the pharmaceutical suppliers as PharmaCo were not willing to support such access. Figure 6-5 summarises the scope of the case study in relation to the SCOR® model. Pharmaceutical suppliers and the ChemCo supply chain are shown in italics to reflect their position in the supply chain but indirect role in the study.

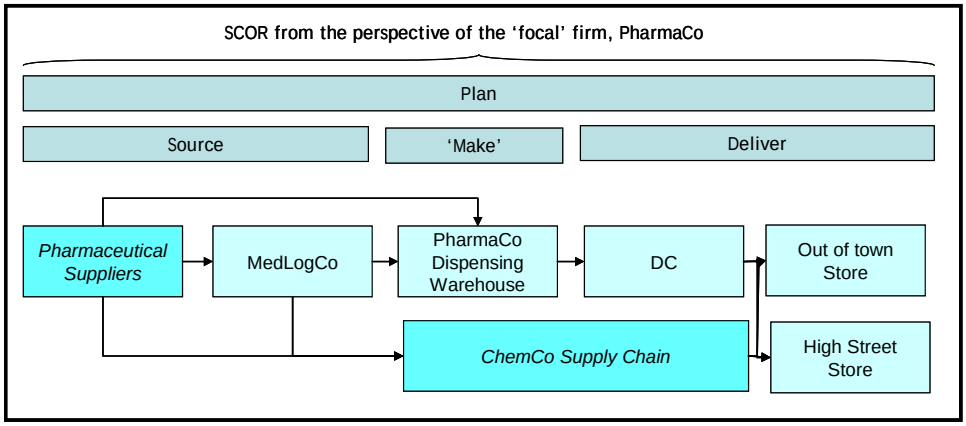


Figure 6-5: Overview of the PharmaCo dispensing supply chain reflecting the research focus

The study focused on the comparison of flow between standard and special product to two stores in the south west, supplied by the Bristol DC. The stores were selected to provide a contrast in the requirements between a 'high street' and an 'out of town' pharmacy. The study also considered the difference in service offered by the PharmaCo and ChemCo supply chains and the effectiveness of using the dual strategy. The focus for the PharmaCo dispensing case is summarised in table 6-4 and a summary of the primary data sources is detailed in appendix 21.

Parameter	Focus for the PharmaCo Case
Operating Business	PharmaCo PLC
Business	PharmaCo
Category	Health & Beauty
Sub-sector	Dispensing
Product / Service	Standard vs. special
Channel	PharmaCo vs. ChemCo
Customers	'Out of town' vs. 'High street' stores
Suppliers	MedLogCo[93]

Table 6-4: Summarising the Focus for the PharmaCo Case

6.3 Content and Outputs

This section focuses on providing the response to research questions CS1 and CS3 – which focus on the descriptive 'what' questions. Section 4.3.1 focuses on understanding what drives PharmaCo's market segmentation strategy and section 4.3.2 its supply chain strategy. This is explored at both a holistic level and also within the individual core supply chain processes (Plan, Source, Make and Deliver).

6.3.1 Market Segmentation (MS) Strategy

Prescriptions (scripts) are typically prescribed by general practitioners (GPs) for two reasons:

1. Repeat prescription for a chronic condition that requires ongoing treatment
2. Acute prescription for an unforeseen illness

To quote the Head of Supply:

'The fact is 80% of scripts are repeat' (MK#5)

This results in a high percentage of return custom. In response PharmaCo has developed two service propositions for repeat prescription customers:

- Prescription collection scheme (PCS) – the pharmacy collects the repeat script from the doctor's surgery on the patient's behalf and informs the patient when their script is ready for collection
- Monitored dosage scheme (MDS) – is a service for institutional customers (e.g. nursing homes) where medicines are ordered separately on a 28-day cycle

Out of town or destination stores tend to have a very low percentage of repeat prescriptions. As a result they need to stock a wide range of products to deal with the *ad hoc* requests of those who visit their stores. The primary concern of a destination store

[93] MedLogCo is the inbound logistics provider for a number of pharmaceutical companies. Contact directly with the pharmaceutical providers was not permitted by PharmaCo.

customer is availability. If the item is not in stock a patient will take their script elsewhere. It is usual for these stores to have 'carousel' style fittings in the pharmacy as these permit the storage of a large number of SKUs in a relatively small space as illustrated in figure 6-6. This was the preferred option of the pharmacy in the destination store visited as part of the case study.

Figure 6-6: A carousel style pharmacy design

In contrast high street stores have a high percentage of repeat prescription business. The high street store that visited by the author had over 80% repeat prescriptions. Taking into account PCS and MDS the store breakdown was

- 60% - PCS[94]
- 10% - MDS
- 10% - standard repeat scripts
- 20% - acute scripts

This store also had a carousel system which it found inappropriate for the high percentage of PCS and MDS business that it dealt with, and believed that a standard galley format would have been more appropriate.

Figure 6-7: A galley style pharmacy design

It is the responsibility of the pharmacy manager to determine the range of products that are stocked. This again can be affected by the format of the store. Stores that are serving a local community (e.g. city centre or high street) and have an identifiable catchment area of GPs may skew the range of products to those that the GPs regularly prescribe

[94] This was a particularly high percentage. The average across all PharmaCo stores is 20%.

e.g. know that there is a tendency to prescribe a particular type of antibiotic. In other formats with a more transient customer base (e.g. travel and destination) this may not be possible and a larger range of products is held. In this sense the product range of every pharmacy is tailored to the needs of the customer base that it serves.

In terms of segmentation, it would therefore appear that the primary base for segmentation is store format. Different formats of store clearly attract customers with different buying behaviours. These buying behaviours form the secondary bases for segmentation which is script type: acute or repeat. Acute scripts drive a relatively unpredictable demand for products based on an emergent condition. Repeat scripts are for the predictable dispensing of medicines for chronic conditions. With repeat scripts there is a further distinction between PCS, MDS and standard repeat scripts. The segmentation bases for PharmaCo are summarised in table 6-5.

Bases of Segmentation			
Primary		Secondary	
Bases	Example	Bases	Example
Store format	Destination, High Street, city centre etc.	Script type	Acute or repeat (PCS & MDS)

Table 6-5: Primary and secondary bases of segmentation in PharmaCo

For the first time in this thesis, hypothesis HCS1:

'Customers are segmented based on buying behaviour driven by an understanding of customer value'

…is accepted as there is a clear link between customer buying behaviour and segmentation, though it may not be referred to in those terms within PharmaCo.

6.3.2 Supply Chain (SC) Strategy

This section begins by looking at the way in which PharmaCo management decisions drive differentiation in each of the core supply chain processes before considering their overarching supply chain strategy.

6.3.2.1 Plan

The planning activities in PharmaCo are carried out by the supply planning function. Their role is to manage three things:

1. Stock availability
2. Inventory management
3. End-to-end cost to serve

In relation to the dispensing supply chain, stock availability is important primarily at the store, but also at the dispensing warehouse. This means that the supply team is also responsible for managing the relationship with ChemCo and MedLogCo from a supply perspective. Inventory management is only relevant in terms of the dispensing warehouse as the supply function has no visibility of stock at individual pharmacies. This is the responsibility of the pharmacist. Analysing the end-to-end cost to serve is a holistic process and includes accessing the cost of the whole network, in particular the trade-offs between using the PharmaCo dispensing SC and ChemCo.

The primary differentiation in the planning processes in the dispensing supply chain is between standard and special products. Standard items are the 20,000 SKUs held in stock by either PharmaCo or ChemCo. Special items are non-stockable and procured in relation to specific pharmacist requests. The planning process for both product types will now be explained in more detail.

6.3.2.1.1 Standard products

The planning process for standard products in the dispensing supply chain is further differentiated between PharmaCo and ChemCo sourced products. The supply team directly manage the supply of the top 1,800 in the PharmaCo dispensing supply chain. The responsibility is outsourced to ChemCo for the remaining 18,000 lines and as a back-up for the 1,800 in-sourced items. The focus for these items is therefore on managing the relationship with ChemCo.

The demand pattern at an aggregate level for products in the dispensing supply chain is described as:

'...very predictable' (TG#7)

The greatest uncertainty was the size of the flu and hay-fever markets in a particular year. There are some small peaks in demand due to holidays. For instance Maundy Thursday (the day before the 4-day Easter bank holiday weekend) is the biggest dispensing day of the year, and November is the busiest month as doctors prescribe two months of repeat prescription in preparation for the Christmas holiday period. As illustrated in figure 6-8 which depicts weekly shipments from the dispensing warehouse to store, the pre-Christmas peak (weeks 45-51) is clearly evident as is the dip in demand over the Christmas period itself (week 52) but apart from that the number of items remains at around 2 million.

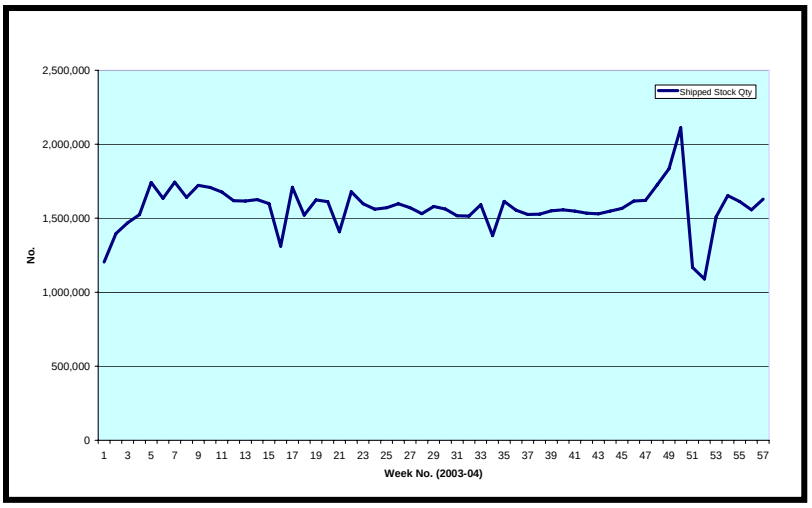


Figure 6-8: Despatches from the dispensing warehouse (Wk 1 2003 – Wk 7 2004)

Given the predictable nature of the demand, the supply planners rely on forecasting tools to generate predicative orders. These are reviewed on a weekly basis, looking out over a rolling 13 week time horizon. The predicative-orders can be accepted, rejected or

modified and are then transferred onto an electronic ordering system with suppliers by EDI. There is a one week fixed time fence in which no changes can be made and a further eight week slush period where changes in agreement with the supplier can be made. Beyond that PharmaCo can make changes without constraints.

6.3.2.1.2 Special products

Special products are non-stockable items that are prescribed to a patient by their GP. When a pharmacist receives a script of this kind they contact the supply team directly, usually by phone or e-mail. The supply chain then procures these items directly. Some items such as compression hosiery are held by specialist wholesalers and can be supplied within 24 hours. Other items require the bespoke manufacture of creams or tablets to a specific patient formulation and can take up to six weeks. There is no formal planning process for these items, with the supply team responding directly to pharmacist demand. These items require a disproportionate amount of resource to manage them. 40% of the supply team are employed to source specials though they only account for 1% of sales. They have to be provided as it is part of PharmaCo's commitment to the government to provide a full range of medicines. PharmaCo's planning parameters are summarised in table 6-6.

Characteristic	Standard products	Special products
Planning unit	Items	No forward planning Reactive process
Horizon	13	
Time fences	Fixed – 1 week Slush – 8 weeks Fluid – 4 weeks	
Frequency of review	Weekly	
Buckets	Weekly	

Table 6-6: Summary of the planning characteristics for the PharmaCo supply chain

6.3.2.2 Source

The primary decision made by the PharmaCo category team is which products will primarily be provided by the PharmaCo dispensing supply chain versus those that will be outsourced to ChemCo. Initially the top 3,200 lines used the PharmaCo supply chain as a primary source but within a year of operation this had been reduced to 1,800. This change was advantageous commercially and improved the operation of the dispensing warehouse. ChemCo is therefore used as the primary source for the tail of 18,000+ products and also as a secondary supply for the top 1,800. With this decision made, the role of the buying team is to secure the supply of the top 1,800 products. The buying team is organised by product category – branded, generic and parallel imports (PI) – as it is believed that each of these product categories requires different purchasing strategies. Branded products are those which are still under patent and are sold under their brand name. They are usually sold by the large multi-national pharmaceutical companies in deals where the profit margin is fixed and there is little room for negotiation.

'I think it's fair to say that the branded ones are commercially the least attractive because in some cases the pharmaceutical companies just choose not to deal' (TG#7)

As illustrated in table 6-7, in Kraljic terms these products could be regarded as 'bottleneck' items as the specification is unique and there is a single source of supply.

Supply may not necessarily be scarce but there is the risk that it could be. Branded buyers need to develop good relationships with the pharmaceutical companies to ensure that their orders are prioritised in times of shortage. It is common for pharmaceutical companies to work with PharmaCo and health related charities to develop health awareness campaigns around particular medical conditions (e.g. asthma).

	Non-critical or Routine	Leverage	Bottleneck	Strategic or Critical
Impact on business	*Low*	*High*	*Low*	*High*
Supply Risk	*Low*	*Low*	*High*	*High*
PharmaCo product categories		Parallel Imports (PI) Generics	Branded	

Table 6-7: Positioning of PharmaCo product categories on the Kraljic matrix

One opportunity that PharmaCo has to procure branded products at a higher profit margin is through the purchase of PI products. These products are bought from other European countries where the pharmaceutical companies have provided the products at a lower cost. The pharmaceutical companies try to guard against this type of activity but it is difficult to eliminate. In Kraljic terms PI could be considered as a leverage items, having both high profit impact but low supply risk (it can be procured through the branded channel). It is an opportunistic form of purchasing and PharmaCo needs to have excellent relationships with the PI brokers to ensure that it is informed when product becomes available.

The final product category is generics. These products are no longer under patent and can be produced by a wide range of manufacturers. Whilst there are some specialist generic manufacturers, these products are generally regarded as relatively high volume - low value commodities. There tends to be multiple sources of supply and deals are negotiated on a volume basis.

'PharmaCo say right, we've got 25% of the market, please quote for our business. The manufacturers are all fighting amongst themselves to give us the best quote for the product' (TG#7)

These products would be classed as leverage as they have high profit impact and low supply risk. These are products for which supply is fairly consistent and purchasing strategy is proactive rather than for PI where it can be reactive.

In summary, the initial sourcing decision for PharmaCo is to determine which products will be provided by its dispensing supply chain versus ChemCo. PharmaCo then segments by product type (branded, generics and PI) to reflect the different type of purchasing strategy required for each product category.

6.3.2.3 Make

Make within the PharmaCo dispensing SC context is the operation of the dispensing warehouse. Within 'make' all products go through the same three basic processes:

4. Receipt
5. Putaway
6. Pick and despatch

The dispensing warehouse operates six days per week (Monday-Saturday) from 06:00-23:00. The inbound processes (receipt and putaway) are essentially a make to stock (MTS) operation. Product is received against the orders placed by the supply team. The suppliers must deliver their product to an agreed delivery slot so there is some advance visibility of receipts. Product is received in crates or on pallets. It is then broken down into single units of handling (typically one pack) to be put away. The first half of the day (06:00-15:00) is dedicated to the inbound processes and the focus for the remainder (15:00-23:00) shifts to the outbound processes (pick and despatch). These processes are 'make to order' as product is picked to fulfil individual pharmacy orders. In theory pharmacies should be able to place orders up to 6pm for delivery by 10am the next day.[95] In practice stores are measured by their ability to place 60% of their orders before 2pm as this helps the warehouse to maintain their pick efficiency. On average the inbound and outbound processes deal with around 2 million items / week. This is a very stable demand pattern with a coefficient of variation of less than 10%. The peak (as shown in figure 6-8) is in anticipation of Christmas and raises despatches to 2.6 million units. There is slightly more variability in the inbound processes to accommodate bulk loads of PI and generic product, and inbound receipts peak at 3 million units. Key attributes are summarised in table 6-8 below.

	Inbound	Outbound
Process	Small batch	Small batch
Asset Utilisation	6 days 06:00 – 15:00	6 days 15:00 – 23:00
No. Variants	1800	1800
Max. Volume / week	3 million	2.6 million
Av. Volume / week	2 million	2 million
MTS/MTO	MTS	MTO

Table 6-8: Key attributes of the inbound, outbound and customisation processes

A driver of differentiation across the entire supply chain is temperature regime. A small number of products require storage within a tightly defined temperature window. These products are transported in temperature controlled crates and stored in temperature controlled zones within the warehouse. They also require special documentation to prove that the temperature regime has been maintained across the supply chain. Apart from that they flow through the supply chain in the same way as ambient products. On the outbound side MDS product is handled differently. It is packed into customer specific crates that are routed to a particular store to be passed directly onto the customer. All other products are packed in mixed crates.

In terms of product: process choice, whilst the processes deal with a relatively high number of SKUs (1800) the variation in how they actually deal with them is relatively low. Across the inbound and outbound processes there is differentiation between ambient and temperature controlled products. On the outbound process MDS is kept separate from general replenishment items. Therefore overall there is a low variety: high volume process as shown in figure 6-9.

[95]Due to their geographical location Scottish stores need to place their orders by 5pm for delivery by 11:00am next day

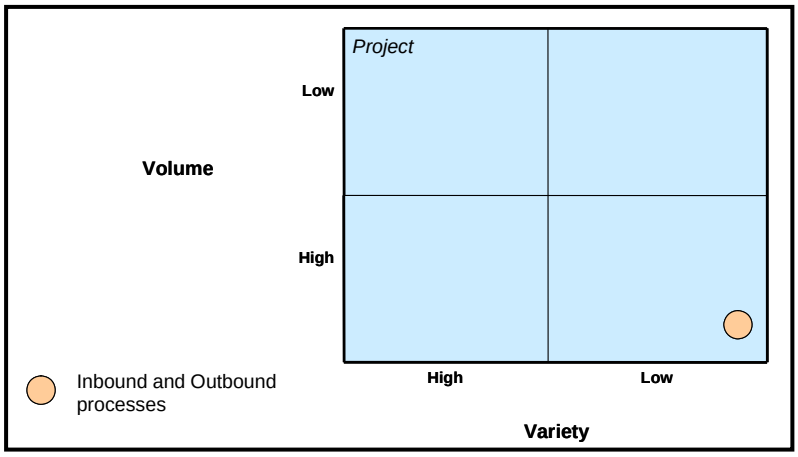


Figure 6-9: Manufacturing product: process at PharmaCo

PharmaCo believes it is most efficient to complete all the inbound process activities before starting the outbound activities. This ensures maximum stock availability and maximises the economies of scale for picking, this is because the warehouse manager believes that:

'…the fewer cuts we do the better' (JU#8)

It means that whilst PharmaCo can be handling products in single items the process that it uses to do so is a batch process.

In conclusion, the 'make' processes within the dispensing warehouse are highly standardised. There are small variations on the basic processes to accommodate different temperature regimes, and the main driver of differentiation on the outbound side relates to the segregation of MDS orders to avoid double handling at the pharmacy. There are indications that warehouse efficiency may be optimised at the expense of customer responsiveness as pharmacies are targeted to place orders early to maximise pick efficiency. This will be explored in more detail in section 6.5.

6.3.2.4 Deliver

The main decision that the pharmacy has to make is from which source – PharmaCo or ChemCo – to order product. The top 1,800 lines should be ordered from PharmaCo's dispensing warehouse if they are in stock. All other lines (excluding specials) are ordered through ChemCo. However,

'ChemCo are used if the pharmacy staff believe that the sale will otherwise be lost' (ZS#14)

The pharmacies have a strict target to order less than 7.5% of the top 1,800 lines from ChemCo. Orders are placed electronically and the system will not allow the order to be processed if product is not available. The PharmaCo electronic ordering system is old and in comparison to the ChemCo system not very user friendly. It is easier to place

orders on the ChemCo system particularly if the product number is not known. ChemCo also has more flexible order cut off points as illustrated in table 6-9.

Process step	Order Type			
	PharmaCo	ChemCo		
	Next day - am	*Next day - am*	*Next day – pm*	*Same day*
Order receipt	18:00 – Day 1	19:00 – Day 1	21:00 – Day 1	11:00 - Day 1
Pick & despatch	23:00 – Day 1	Unknown	Unknown	Unknown
Deliver	10:00 – Day 2	10:00 – Day 2	13:00 – Day 2	15:00 – Day 1

Table 6-9: Indicative timings for deliver process for PharmaCo and ChemCo

ChemCo will receive orders up to 19:00 on day 1 for delivery by 10:00 day 2. The PharmaCo cut off is officially 18:00 (1 hour earlier) but the pharmacies have a target to order 60% of product before 14:00. ChemCo also accepts orders until 21:00 on day 1 for delivery by 13:00 on day 2, and has a same day service whereby orders received before 11:00 day 1, are delivered by 15:00 that afternoon. Concern was expressed that:

'The PharmaCo ordering process is out of sync with store opening hours' (ZS#14)

Out of town stores typically open from 10:00-21:00, but 60% of orders need to be placed by 14:00, even though the store has only been operating for 38% of its working day. Whilst…

'ChemCo is used to plug the gaps' (AR#12)

…this can be in conflict with the strict target for ChemCo usage. From a logistics perspective the movement of dispensing product is straightforward. Product is collected in store specific crates from the dispensing warehouse by 23:00 and cross-docked through the relevant DC to store. The process is the same for all products but the crates may differ depending on temperature regime and MDS requirements. Transportation is shared with other product categories both in terms of the trunk routes to DC and store specific deliveries; it is not specific to dispensing.

In conclusion, the main driver of differentiation in the deliver process is the choice of supplier – PharmaCo or ChemCo. Whilst this is primarily determined based on a Pareto analysis (top 1,800 lines vs. rest) lead time is also a major consideration, particularly when the sale is in jeopardy.

6.3.3 Overarching strategy

PharmaCo had a clearly articulated supply chain strategy and there was logic in the way the drivers of differentiation – within each of the core supply chain processes – had developed. The relocation of the dispensing warehouse provided PharmaCo with the opportunity to start from scratch and develop what they believed was the optimum supply chain strategy. Given the broad product range (20,000 SKUs) and strict government targets (scripts to be fulfilled within 24 hours) PharmaCo decided to adopt a hybrid strategy. The top 1,800[96] products and 'specials' were sourced internally, whilst the remainder were outsourced. From a pharmacy perspective the primary decision was therefore one of where to source a particular product. The primary decision making criteria was the Pareto analysis but a secondary consideration was lead

[96] This was initially 3,200 but as previously discussed reduced to 1,800

time. Some PharmaCo lines were sourced from ChemCo if a shorter lead-time was required. All special products were sourced through PharmaCo with the pharmacist liaising directly with the supply team. Product was provided to the pharmacy in store specific crates. The type of crate varied primarily based on temperature regime, and then based on replenishment type. MDS orders were packed in separate crates to simplify delivery to the end customer. The dispensing warehouse was in effect a decoupling point in the supply chain as it held stock for the top 1,800 lines. The supply team planned the replenishment of these standard products using statistical forecasting techniques. The team also responded to demand from the pharmacies for 'special' products on an *ad hoc* basis. The main differentiation from a planning perspective was product type (standard vs. special). The buying team focused on the purchasing of standard product which it categorised into three product types: branded, PI and generic. This differentiation was driven by the different purchasing skills required. A summary of the drivers of differentiation within the core supply chain processes in the PharmaCo supply chain are summarised in table 6-10.

Core Process	Current explicit driver of differentiation	
	Primary	Secondary
Plan	Product type (standard vs. special)	
Source	Product category (Branded, PI, Generic)	
Make	Temperature regime (ambient vs. temperature controlled)	Replenishment type (MDS or standard replenishment)
Deliver	Source (PharmaCo or ChemCo)	Lead time

Table 6-10: Explicit drivers of differentiation within the core supply chain processes at PharmaCo

The PharmaCo supply chain strategy has to meet strict performance criteria set by the UK government which is focussed on ensuring that all scripts are fulfilled within 24 hours. This means the whole supply chain strategy is developed to meet this target. Hypothesis HCS2:

'*Supply chain strategy is developed in response to the customer segmentation strategy'*

… is therefore accepted. Further evidence of this customer facing approach is evident in the flexibility that the pharmacist has to switch the source of a particular script to reduce the lead time to meet consumer needs. The supply chain strategy also has specific solutions for MDS and 'specials'. MDS orders are pre-packed in the dispensing warehouse to simplify pharmacy operations and special orders are dealt with by a specialist team that liaises directly with the pharmacy.

6.3.4 Performance Measures

Sections 6.3.1 and 6.3.2 have focused on the explanation of the core processes involved in developing market segmentation and supply chain strategy. The purpose of this section is to present the performance measures that support this strategy. PharmaCo had adopted a balanced score card approach to performance measurement. It was used by PharmaCo as per the text book to help the company deliver its strategic imperatives by balancing financial measures with the perspective of the customer, employees and processes. As illustrated in figure 6-10, PharmaCo depicted this as four quadrants in a circle – finance, customer, people and operational excellence (OE).

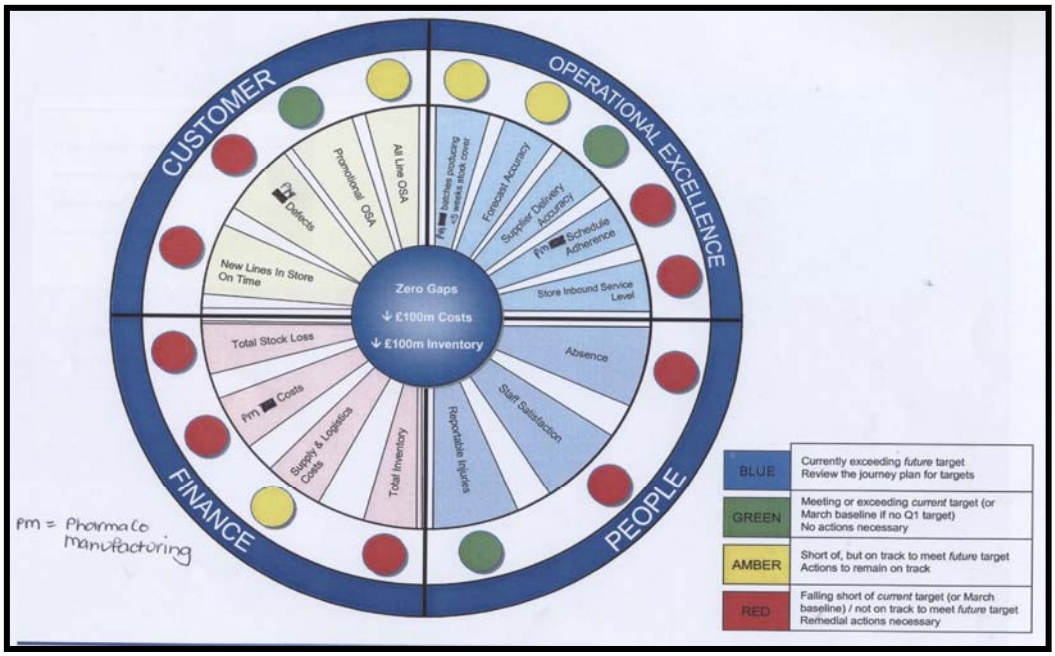


Figure 6-6-10: The PharmaCo supply chain balanced score card (October 2003)

Each quadrant has 3-5 key performance measures which contribute directly to the strategic goal that is displayed in the centre. They use a modified traffic light system to provide a visual representation of performance against target. The BSC is reviewed on a monthly basis by the supply chain senior management team. This visual summary forms the first page of a 19 page report which provides the detailed information that underpins this summary. The quantitative summary which provides the navigation tool to this report is detailed in appendix 22.

The BSC approach had been recently adopted by PharmaCo and the intention was that the approach would be used at all levels in the organisation. In terms of the dispensing SC, BSC was being used in the dispensing warehouse, RDC by TruckCo (the third party logistics provider) and in store. They were focused on the same four key quadrants but the key performance measures were adapted to suit the application. An example of the BSC used by the dispensing warehouse is detailed in appendix 23, and for TruckCo in appendix 24. A common issue at an operational level was the level of aggregation within the scorecard; head office required information at a different level of aggregation from the operation. To quote the DC group manager:

'In March 2002 we moved to a regional score card rather than a DC specific score card. We are now having the debate with head office about moving to a dual system. Senior management need the regional perspective, but it loses a level of detail that is useful for actually managing a DC' (SM#10)

In the meantime the DCs were informally using a dual system. They displayed the regional scorecard so…

'… that we are seen to do the right thing' (AD#11)

…but actually used the historic measures to run the DC. This problem was common across the supply chain and not isolated to the DC. For instance whilst the pharmacy was included within the store BSC, the pharmacy used a separate set of measures to

monitor their performance. These measures were provided by the supply team on a weekly basis and provided a measure of absolute performance and a ranking within stores of a similar format as illustrated in table 6-11. They are a relatively balanced set of measures though do not include people as this is measured locally and included in the store BSC.

KPI	BSC Quadrant	High Street Store (1 of 183 stores)		Out of town store (1 of 18 stores)	
		Performance	Ranking	Performance	Ranking
Orders placed before 2pm	OE	32.67%	163rd	60.98%	7th
Lines stocked in the dispensing warehouse that are ordered via ChemCo	Finance	19.5%	183rd	3.83%	1st
Write offs	Finance	1.12%	146th	0.85%	14th
Owings (scripts that cannot be fulfilled from stock)	Customer	1.24%	40th	2.13%	2nd

Table 6-11: Pharmacy KPIs (week 4, 2004)

The BSC approach did provide a consistency and balance in the measures that were used across the supply chain and there was a focus on all four quadrants. They were compiled and reviewed monthly driven by the need to contribute the top level supply chain BSC. This was the only common review mechanism across the supply chain and it was unclear if more frequent operational reviews took place. Table 6-12 provides a summary of the KPIs extracted from the BSCs that represent the core supply chain processes. They are a relatively focused set of KPIs with a bias towards customer and process measures.

Unit of Analysis	Key Performance Measures (KPIs)	BSC quadrant	Target
Plan	Forecast accuracy	OE	tbd
Source	Supplier delivery accuracy (%)	OE	95%
Make	Service level	Customer	99.5%
	Accuracy	OE	<5% errors
Deliver (Logistics)	OTIF store delivery	Customer	98%
Deliver (Store)	On shelf availability (inverse of Owings)	Customer	97%

Table 6-12: Summary of Key Performance Indicators in used in the PharmaCo supply chain

To conclude, PharmaCo had adopted a BSC approach to performance measurement that was effective for senior management. As this system cascaded through the core supply chain processes, the level of aggregation was often found inadequate to effectively manage the process. As a result managers would augment the BSC measures with a more detailed set of measures that they actually used to manage their process. The BSC drove a consistent monthly reporting and review process across the PharmaCo supply chain but there was no consistent method for conducting more frequent operational reviews.

6.3.5 Relationship between MS & SC Strategy

The purpose of research question CS3 was to identify the relationship that existed between market segmentation and supply chain strategy. This was further expanded by hypothesis HCS3 which stated:

'There is a direct link between customer segmentation and supply chain strategy. Different behavioural segments drive different supply chain strategies.'

The case study found that the primary base for segmentation was store format, with different formats attracting customers with different buying behaviours. These buying

behaviours formed the secondary bases for segmentation which is script type: acute or repeat. With repeat scripts there is a further distinction between PCS, MDS and standard repeat prescriptions. Acute prescriptions have unpredictable demand and patients usually want the product quickly. PharmaCo aims to have 97% of products in stock and each pharmacist has the power to develop their own stock profile based on the usage patterns to meet this target. PharmaCo has a commitment to source non-stock items within 24 hours. They understand that time is of the essence and there are a number of delivery options open to the pharmacist to provide the product in a time window that is acceptable to the patient. Depending on the time of day, the product and the urgency with which it is required, product can be procured either from PharmaCo or ChemCo. For repeat prescriptions the demand is more predictable which enables the pharmacies to place orders in advance and minimise the use of ChemCo. For MDS products the orders are of a sufficient size that the dispensing warehouse can actually pack them into customer specific crates that can be cross-docked through store to the customer. Whilst there is not a one-one relationship between behavioural segments and supply chain strategies, there is a one-many relationship. This provides the contingency required to ensure PharmaCo meets both government and patient expectations. HCS3 is therefore accepted.

6.4 Underlying Mechanisms

Section 6.4.1 begins with a review of contextual factors that may drive the development of CRSC from both an internal and external perspective. Section 6.4.2 is more introspective and focuses on the identification of 'root causes' that, depending on context and/or use, enable or inhibit CRSC strategy.

6.4.1 Contextual factors

There were five contextual factors identified during the CleanCo and 4PLElecCo studies that impact on the development of CRSC strategy: globalisation, outsourcing, fragmentation, relative size, market polarisation and global economic cycles. Each of these factors and an additional factor – regulatory environment – is discussed in turn. The impact of each factor is summarised in table 6-13.

Contextual Factor	Impact	Potential Upside	Potential Downside
Globalisation	Manufacture of generics is transferring to developing countries	Lower costs	Risk of counterfeits
Outsourcing	Hybrid sourcing strategy	Maximise customer service whilst minimising SC costs	Over use of ChemCo which increases SC costs
Fragmentation	Increase in the range of services offered to the customer	Customer loyalty and better visibility of demand	Requires new supply chain solutions
Relative size	25% UK market	Increased bargaining power with generic manufacturers	Seen as a threat by the UK government
Market polarisation	Generics vs. branded products	Increased profit	Added complexity. Customer dissatisfaction.
Global economic cycles	No significant impact		
Government regulation	UK government is the ultimate customer	Limits the amount of competition	Government believes pharmacies are making too much profit

Table 6-13: Summary of key contextual factors and their impact on the PharmaCo SC

6.4.1.1 Globalisation

Given the UK centric nature of the PharmaCo supply chain, globalisation has a relatively limited effect. It is, however, beginning to have an impact on the sourcing of generic products. Increasingly these are being produced in lower cost, developing countries (e.g. India). This provides an opportunity to procure product at lower cost and increase profit margin but has to be balanced against the risk of procuring substandard or counterfeit product.

6.4.1.2 Outsourcing

PharmaCo has proactively used a hybrid in-house and outsourced strategy for its dispensing supply chain. This has the perceived benefit of maximising customer service whilst minimising total supply chain costs. Given the increased flexibility of the ChemCo service and its user-friendly ordering system there is a danger that pharmacists will overuse ChemCo. This does not have a detrimental effect on customer service, but may increase total supply chain costs. Stores should not procure more than 7.5% of the top 1,800 lines through ChemCo and this is a carefully monitored target. As illustrated in table 6-11, this target is not always adhered to; the high street store ordered 19.5% of the top 1,800 lines from ChemCo. Frequent monitoring and review of this target is required if the careful balance between customer service and supply chain cost is to be maintained.

6.4.1.3 Fragmentation of Demand

As PharmaCo continues to innovate its customer service, this leads to an increase in the number of different services that it offers. A recent development is the opening of PharmaCo pharmacies in health centres and doctors' surgeries, a significant change from the traditional in-store model. PharmaCo is also investigating options for home delivery of repeat prescriptions. Service innovation is good for maintaining customer loyalty and if it enables PharmaCo to get closer to demand, it has benefits for supply chain planning. The downside is that some of the services developed may require a different supply chain solution to that currently offered. For instance, would home deliveries be fulfilled centrally from the dispensing warehouse or locally from the nearest pharmacy? Whilst the supply chain strategy may continue to evolve to meet such service innovation, the bigger question remains: At what point will it demand a wholesale rethink of the overarching supply chain strategy?

6.4.1.4 Relative Size

PharmaCo is a significant player in the UK pharmacy industry with around 25% market share. PharmaCo currently uses its size to negotiate better deals with its suppliers, particularly for generic products. The downside is that the UK government feels threatened by PharmaCo's size and is keen to try and reduce its profit.

6.4.1.5 Market Polarisation

Market polarisation in the pharmaceutical industry is typified by the difference in branded 'premium' products and generic 'commodity' products. For branded products the balance of power is with the manufacturer and there is little room for manoeuvre for PharmaCo in terms of price. PharmaCo is typically offered a fixed 12.5% margin. Generics afford the opportunity for PharmaCo to leverage its relative size and negotiate the best deal with a number of different suppliers. This means that there are potentially

multiple manufacturers of the same product each with their own specific pack. From a supply chain perspective this can add complexity as there is pressure to assign manufacturer specific product numbers for the same product. This could greatly increase the number of pick faces required in the dispensing warehouse. Many customers, particularly the elderly, are also suspicious if the manufacturer of a particular product continually changes. Whilst the changes are cosmetic and do not affect the efficacy of the product, these changes are not well received. This is a cause of a number of customer complaints. A careful balance needs to be maintained between the commercial team negotiating the best deal on generics and the impact it has on customer satisfaction and supply chain efficiency.

6.4.1.6 Global Economic Cycles

Given the UK centric focus of the PharmaCo dispensing SC this factor has no significant impact.

6.4.1.7 Government Regulation

PharmaCo's pharmacy operations are subject to strict government regulation. This is aimed at ensuring a high quality of service to the patient at minimum cost. An upside is the strict controls that the government places both on the number of pharmacies permitted in the UK and the companies that operate them, limiting the amount of competition. The downside is the government's desire to restrict the profitability of those who do compete. PharmaCo is one of the largest players and is therefore an obvious target.

6.4.2 Enablers and Inhibitors

As mentioned in section 5.4.2, the intention when dealing with the enablers and inhibitors was to use the frameworks developed during the CleanCo and 4PLElecCo analysis as a starting point for this case. The first step was to identify the raw factors from the case analysis. The next step was to consider the type of alignment that the factors affected and whether the impact was positive or negative. As summarised in table 6-14, alignment was commonplace in the PharmaCo supply chain. This was a truly customer responsive supply chain that had exemplary external alignment with the end customer. Alignment was specifically designed to provide the 1,400+ pharmacies with the range of 20,000 products that they may need to dispense. Its objective went beyond achieving the government target of dispensing product within 24 hours to dispensing 98% scripts from stock. The pharmacist had the autonomy to develop the most appropriate stock profile to meet the customers' needs. For non-stock items the pharmacist also had the authority to source product in the most appropriate way to meet customer needs Such a high degree of customer alignment would not have been possible without a high degree of alignment in the end to end supply chain. The hybrid system provided a flexible, responsive and cost-effective approach to both pharmacy and patient needs. It provided natural contingency for the top 1,800 lines, a separate supply chain for 'specials', and provided MDS orders in customer specific crates to simplify dispensing. The focus was on end to end supply chain cost and a careful balance was struck between PharmaCo and ChemCo sourced products to maximise customer service whilst minimising SC cost. Given the increased flexibility and ease of use of the ChemCo order process there was the potential for this route to be over used, with the knock-on effect of increasing SC costs.

Alignment Type		Status	Enabling Factors	Inhibiting Factors
Strategic alignment		☺	• Clearly defined SC priorities • Clearly defined store segmentation strategy • Common objective shared through the BSC	
Internal alignment	Between dispensing SMT & rest of dispensing team	☺	• Common objective shared through the BSC	
	Between commercial and SC functions	☺	• Co-located on the same site • Job rotation between buying and supply teams • Supply team is a boundary spanning role that manages the relationship with a number of stakeholders including commercial	
	Between the core SC processes	☺	• Co-located on same site • SC expertise	
	Between the SC and internal customer (pharmacy)	😐	• Strict store delivery schedule • Standardised processes • Service level in excess of 99.5%	• Dispensing warehouse opening hours out of sync with store opening hours • Potentially conflicting measures (customer service vs. warehouse pick efficiency) • PharmaCo ordering system is old and more difficult to use than ChemCo system
External alignment	Suppliers	☺	• Good relationship with ChemCo and willingness to change approach if there is mutual benefit to both parties • Good relationship with MedLogCo and TruckCo	• Difficult to negotiate with branded suppliers. They have the power and offer standard terms.
	Customer (patient)	☺	• Clearly defined customer service levels • Focus on retaining customer order • Pharmacist controls stock and sourcing decisions to meet customer needs	
End to End SC alignment		☺	• Hybrid design • Clear roles and responsibilities • Flexible and responsive to patient needs • Built in contingency for top 1800 lines • Separate SC for 'specials' • MDS orders packed into customer specific crates to simplify dispensing • Focus on end-to-end (e2e supply chain cost • Shared outbound logistics • BSC approach used across the supply chain (internal and external) • Standardised monthly review process • Issue management	• Potential overuse of ChemCo • Dual KPI system of BSC and WCM at process manager level. The BSC measures are not specific enough to make management decisions • Process for daily and weekly performance review not clearly defined

Table 6-14: Enablers and Inhibitors to the alignment of the PharmaCo dispensing supply chain

One way in which SC costs were reduced was by using existing logistics provision from central warehouse to DC, and DC to store, with other product categories for the PharmaCo sourced products.

A BSC approach was used to strategically align the dispensing supply chain to the wider PharmaCo supply chain strategy. It helped to communicate a clearly defined set of priorities throughout the SC and hence ensured a high degree of strategic alignment. This approach was used not only by the senior management team but across the supply chain both internally and externally. It was reviewed on a monthly basis using a standardised format; it reviewed absolute performance against target and also sought to identify the key performance issues for resolution. The system was relatively immature and whilst it was an excellent tool for the senior management team, the information provided was not specific enough for the process managers to make decisions. They therefore augmented the BSC with a set of WCM appropriate to their process. Another area for development was the frequency of review. Whilst there was a standard process for monthly review, the process for daily and weekly review was not clearly defined.

Given the high degree of end to end supply chain alignment, it follows that there would be a correspondingly high degree of internal alignment. Alignment between the senior management and the broader dispensing management team was enabled by the BSC. Alignment between the commercial and supply chain functions was enabled by co-location on the same site, job rotation between buying and supply roles, and creation of the boundary spanning supply manager role. This role actively seeks to optimise the trade off between inventory and stock availability to minimise e2e SC costs. It involves managing the relationship between the commercial and supply chain, and facilitating the resolution of trade-off decisions. Alignment between the core SC processes was also enabled by co-location and the expertise within the SC. One area for potential improvement was the alignment with the internal customer, the pharmacies. Whilst the dispensing warehouse consistently achieved a service level[97] of 99.5%, and a strict store delivery schedule ensured that all product was received by 10am each day[98], there were three factors that could inhibit this alignment. The first was a belief that the dispensing warehouse operating hours were out of sync with store opening hours. Many stores opened 7 days / week from 10am-9pm, yet the dispensing warehouse only operated 6 days / week and would not receive orders after 6pm. It also encouraged stores to place 60% of their orders before 2pm to help improve pick efficiency. This highlights a potential conflict between measures of customer satisfaction vs. pick efficiency. A further source of misalignment was the PharmaCo ordering system. It was old and more difficult to use than the ChemCo system. If a pharmacist was under time pressure it was common practice to order through ChemCo rather than PharmaCo as it was quicker. PharmaCo had good relationships with ChemCo as it had with other suppliers including MedLogCo, TruckCo and pharmaceutical suppliers. The relationship with branded suppliers was perhaps inhibited by their unwillingness to negotiate. This was the same for all pharmacy companies and did not place PharmaCo at a disadvantage.

The next step in the analysis was to categorise the factors identified in the enabler and inhibitor analysis as artefacts, mechanisms or assumptions and create a culture map as illustrated in figure 6-11.

[97]

[98] 11am for Scottish stores

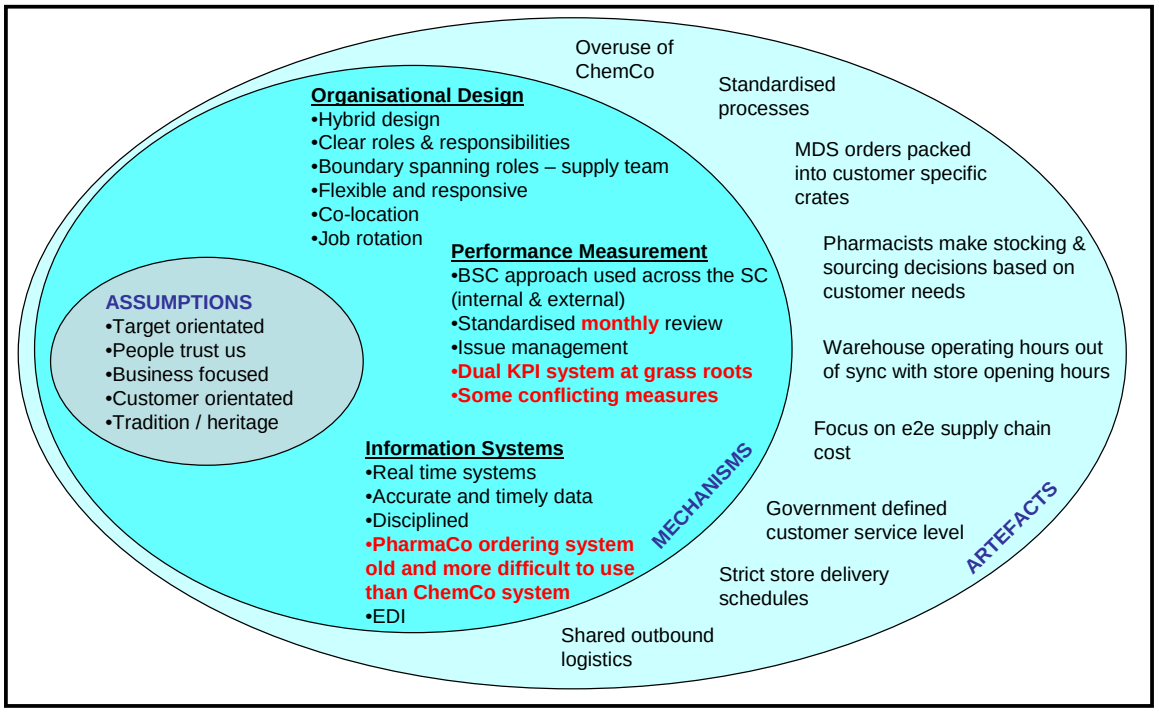


Figure 6-11: PharmaCo dispensing SC – Levels of Culture (after Schein (1992))

At the heart of the PharmaCo dispensing supply chain are embedded assumptions about the way that the supply chain operates, based on tradition and heritage and an assumption that 'people trust us'. PharmaCo seeks be customer responsive yet is balanced against the realities of delivering shareholder value. It is a target orientated culture. A broad range of artefacts provide the visible manifestation of this largely positive paradigm. The crucial link between the assumptions and artefacts is the mechanisms. The mechanisms are the same as for both the CleanCo and 4PLElecCo case studies but the way they have been used is different. This will be discussed in more detail in section 7.4.2 of the cross-case analysis. Each of the three mechanisms (organisational design, performance measurement and information systems) is supported by factors which are largely enabling. Factors that had an inhibiting effect are identified in red in figure 6-11. These are focused on relatively minor aspects of the PharmaCo information and performance measurement systems. The issue with the legacy IS system has a link to the embedded assumptions around tradition and heritage. At one time the system was state of the art but PharmaCo had been slow to replace it with a more contemporary system. This upgrade had started at the time of the case study, but shows how this assumption could cause PharmaCo to fall behind the competition. PharmaCo's business orientation drove the development of a BSC that was ideal for the senior management team but lacked the granularity required to make management decisions within the individual SC processes. This provided the opportunity for target orientated managers to develop their own set of measures that drove the performance of their process but could conflict with broader SC objectives, e.g. what is more important, improving warehouse pick efficiency or fulfilling customer orders? In essence this is a conflict between the assumptions of target and customer orientation; not an easy conflict to resolve.

6.5 Potential for Improved Customer Responsiveness

Given that the PharmaCo dispensing supply chain supported all three hypotheses, and has a high degree of alignment – strategically, internally, externally and e2e – it could be argued that it is already customer responsive. Potential to further improve its customer responsiveness would rest in addressing the inhibiting factors identified in section 6.4.2. These were primarily focused on improving the internal alignment between the SC and pharmacies and aspects of the e2e supply chain alignment linked to the improvements in the performance measurement system.

6.6 Chapter Summary

The primary purpose of this core case was to provide data to address the six research questions that underpin the studies for this thesis. In terms of addressing the descriptive 'what' research questions CS1 and CS3, it was found that PharmaCo uses store format as the primary base for segmentation. Different formats of store clearly attract customers with different buying behaviours. These buying behaviours form the secondary bases for segmentation which is script type: acute or repeat. The pharmacist had the autonomy to determine stock and sourcing decisions to ensure that both government targets and patient needs were met. 98% of scripts were met directly from stock with the remaining 2% usually dispensed within 24 hours. 'Specials' which accounted for less than 1% of sales were an exception to this rule. These items were non-stock items that had to be ordered directly from medical distributors. The lead time could vary between 24 hours - 6 weeks, depending on the product. Pharmacists dealt directly with the supply team to order these products. PharmaCo had developed a hybrid supply chain strategy to reliably meet these stringent targets in a cost effective way. PharmaCo in-sourced the provision of the top 1,800 lines through a purpose built dispensing warehouse. The remaining 18,000 lines were sourced through ChemCo who also provided a back-up source for the top 1,800. The balance between in-source vs. outsourced product was carefully adjusted to give maximum benefit to PharmaCo both operationally and commercially. The ChemCo ordering system was more user friendly than the PharmaCo system, and it offered more flexibility in terms of delivery options. There was therefore a danger that this careful balance could be disrupted if too many orders were placed through CleanCo. Whilst there was not a direct one-to-one relationship between the different strands of the supply chain solution and different behavioural systems, there was a one-to-many relationship. The most appropriate supply source was pre-determined based on the Pareto analysis, but the pharmacist had the autonomy to switch source to ensure that a sale was not lost.

Two hypotheses supported research question CS1 and both were supported in the PharmaCo case. The first HCS1 was supported because there was a direct link between the store segmentation and customer buying behaviours. HCS2 was supported because the PharmaCo supply chain strategy was developed in direct response to customer needs. This links into HSC3 which supported research question CS3. It was supported because there was a direct link between segmentation and supply chain strategy and it was driven by buying behaviour. The link between behavioural segments and supply routes was not a one-to-one relationship but one-to-many. This gave the flexibility and reliability of response to meet the stringent government and patient needs.

In addressing the explanatory 'why' questions CS2 and CS4, only five of the six contextual drivers originating from the CleanCo and 4PLElecCo cases were supported by the findings from this case. Given the UK-centric focus of the case study, global economic cycles were found to have little impact on the PharmaCo dispensing supply chain. However, government regulation had a major impact and was identified as a new driver. Evidence was also found to support the three mechanisms previously identified. As with the 4PLElecCo case, the mechanisms were generally found to be applied in a generally positive way. Some aspects of the information and performance measurement had an inhibiting effect but overall their effect was minimal. As would be expected there was a link between these inhibiting factors and the embedded assumptions upon which the PharmaCo culture had developed. For instance, their respect for tradition and heritage had delayed the implementation of a new dispensing ordering system.

Research questions FP1 and FP2 were focused on the future potential for improved customer responsiveness in the PharmaCo dispensing supply chain. Given that the supply chain was already delivering a high degree of customer responsiveness the potential for further improvement was limited. The main areas for improvement would be overcoming the inhibiting effects of the information and performance measurement systems.

To conclude, the PharmaCo core case has built upon the learnings from the CleanCo and 4PLElecCo case studies and has continued to identify some interesting similarities and differences for consideration in chapter 7 – cross-case analysis.

7 Cross Case Analysis

7.1 Introduction

As mentioned in section 3.2.3.2, the strength of multiple case study research is that it provides theoretical or literal replication (Yin, 1994) of results. This is often considered more compelling, and the overall study is regarded as more robust (Herriott, 1983). Given the context-specific nature of SCM, literal replication is unlikely and hence the research design sought to provide an opportunity to look for theoretical replication of the guiding principles and generative mechanisms that underpin the development of CRSC strategy. The purpose of the cross-case analysis chapter is to present a comparison of the individual case data – from chapters 4, 5 and 6 – to aid their identification.

As illustrated in figure 7-1, the structure of this chapter reflects the structure of the case studies. It begins in section 7.2 with a comparison of the contexts in which the three case studies were embedded, before presenting the similarities and differences of the contents & outputs in section 7.3. Section 7.4 provides a contrast of the underlying mechanisms before the chapter is brought to a close with a summary in section 7.5. This chapter lays the foundation for chapter 8 in which a summary of key findings and contribution to knowledge of the research will be discussed.

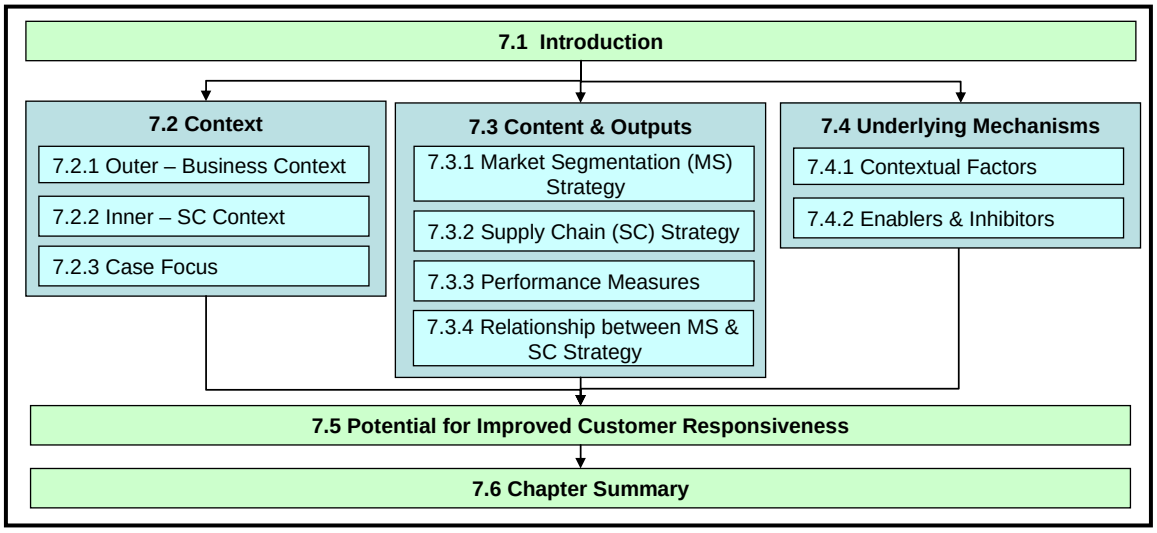


Figure 7-1: Structure for Chapter 7 (Cross case analysis)

7.2 Context

Pettigrew (1992) argues that understanding context (both outer and inner) is an essential part of case based research design, as it is inextricably linked to the business processes embedded within it. This is particularly true for the messy reality of SCM. Section 7.2.1 provides an overview of the outer-business contexts that provide a backdrop for the case studies before the inner-supply chain contexts are compared in section 7.2.2. Section 7.2.3 concludes with a comparison of the case study foci.

7.2.1 Outer – Business Context

The focal firms were chosen for their contrasting roles in the supply chain. CleanCo was a manufacturer of consumer packaged goods (CPG), 4PLElecCo a lead logistics provider and PharmaCo a retailer of health & beauty products. Both CleanCo and PharmaCo were UK based studies, whilst 4PLElecCo was based in the Netherlands but serviced accounts across Europe (EU 15+2 countries). CleanCo had a largely vertically integrated supply chain structure with limited outsourcing of manufacturing and logistics activities. In contrast, 4PLElecCo managed the EMEA supply chain on behalf of ElecCo and it was an outsourced or 'virtual' model. PharmaCo adopted a hybrid model for their dispensing supply chain running in-house and outsourced supply chains in tandem. As a retailer PharmaCo had a relationship with the end consumer, whilst CleanCo and ElecCo focused on servicing the needs of a business-to-business relationship. These important contrasts are summarised in table 7-1.

Descriptive Variables	**Case study**		
	CleanCo	**4PLElecCo**	**PharmaCo**
Case context			
Role of focal firm	Manufacture of CPG	Lead Logistics Provider	Retailer of health & beauty products
Geographical scope	UK	Europe (EU+2)	UK
End-customer relationship	Business to Business	Business to Business	Business to Consumer
SC type	Vertically Integrated	Outsourced	Hybrid
Year of financial data	2000	2002	2003
Year of case study	2001/02	2002	2003/04
Parent company	**CleanCo International**	**4PLCo**	**PharmaCo PLC**
Sales turnover (£ billion)	0.4	15	5.1
Product range	Cooking oils & fats Toiletries & cosmetics Detergents Fridges & air compressors	Parcel network operator Logistics services	Health & beauty products / services
Business divisions	Europe Africa Asia	4PLairfreight 4PLparcelsUS 4PLparcelsIntl 4PLSCS	PharmaCo Retail PharmaCo Medical
# Employees	11,000	380,000	75,000
Focal business unit	**CleanCo UK**	**4PLElecCo**	**PharmaCo UK**
Business division	Europe	4PLSCS	PharmaCo Retail
Sales turnover (ratio)	0.12	1	4.8
Product range	Toiletries & cosmetics Detergents	SCM Transportation Service Parts Logistics	Health & beauty Baby, food & photo Seasonal gifts
# Employees	450	120	54,000

Table 7-1: Comparison of the business context for the three case studies

Table 7-1 also provides some useful comparisons of the parent companies and business divisions of the focal firms. For instance, the ratio of business division turnover for the three focal firms was 1: 8: 40, which gives an indication of their relative size. This comparison was starker when numbers of employees were considered, with a resulting ratio of 4: 1: 450. This reflects both the size and role of the focal firms. CleanCo was a relatively small manufacturing organisation, 4PLElecCo a relatively small LLP, with a high dependency on outsourcing, and PharmaCo a large retailer, with a substantial workforce to cover their range of manufacturing, warehousing and retailing activities.

7.2.2 Inner – Supply Chain Context

The top level dimensions that apply to the core supply chain processes for the three case studies are compared in table 7-2. Starting with the 'deliver' process, there were two key sets of dimensions: customers and carriers. CleanCo had a customer base of 210+ customers of whom the top 13 were considered to be key accounts. The ElecCo EMEA supply chain customer base was approximately half this size consisting of 100 tier one service provider customers and a further seven European Distribution Partners (EDPs). On average 4PLElecCo delivered to 60 customers / week. PharmaCo had by far the largest customer base. The supply chain served 1,428 stores on a daily basis. PharmaCo's footfall was second only to the Post Office, and one in three UK residents visited a PharmaCo store each week. All three members of the supply chain outsourced their outbound logistics activities. Given the UK centric focus of their supply chains, CleanCo and PharmaCo outsourced their activities to one named carrier. 4PLElecCo had the EU 15+2 countries to cover and were also under pressure from ElecCo to demonstrate a multi-stranded approach. They therefore outsourced their outbound activities to three named carriers and approximately ten specialist carriers.

Focal Firm	Source	Make	Deliver	
CleanCo	***Suppliers*** Approx 150 Fats & Oils – 6 brokers Raw materials – 135 Labels – 2 Bottles – 2 Closures – varies Corrugated – 1	***Stock Keeping Units*** Approx. 80 generics or families 240 SKUs No. of SKUs vary by level of promotional activity	***Carriers*** 1 main carrier HaulierCo *Exceptions:* Customer A – send in Securicor Customer B – collect (backhaul) Customer C – collect	***Customers*** Over 210 customers *National accounts* 10 accounts (70% value) *Field sales* Over 200 accounts (30% value)
4PLElecCo	***Suppliers*** 1 Freight Forwarder InboundCo 3 Airlines	***ELC*** ***Customisation Centre Stock Keeping Units 50 base unit variants*** 5 cable variants	***Carriers*** 3 named carriers + approx 10 specials Named Carriers: Outbound1Co Outbound2Co Outbound3Co	***Customers*** 1 client – ElecCo Ship to 107 customers on their behalf (on average 60 customers / week)
PharmaCo	***Pharmaceutical suppliers*** 200 ***Inbound logistics*** MedLogCo	***Dispensing Warehouse Stock Keeping Units*** 1,800 highest volume items ***MedCo Warehouse Stock Keeping Units*** 18,000+ lower volume items + back-up service for top 1,800	***Distribution Centres (DCs)*** 17 *Hauliers* TruckCo	***Stores/Pharmacies*** 1,428 ***Customers*** 1 in 3 UK residents visit a PharmaCo store each week

Table 7-2: Top Level Dimensions for the three case studies

The 'make' activities at the heart of each case study varied. CleanCo manufactured a range of 240+ toiletry and detergent SKUs, with the exact number varying by the level of promotional activity. At the heart of the ElecCo EMEA supply chain was the 4PLElecCo managed European Logistics Centre. This centre performed two activities. Firstly, the receipt, consolidation (if appropriate) and despatch of standard cartons for distribution across the EU 15+2 countries and secondly the addition of five different cables to 50 base SKUs on a build and ship to order basis in the customisation centre. In contrast the 'make' activity at the centre of the PharmaCo dispensing supply chain was a classic warehousing operation. PharmaCo operated its own warehouse to

despatch the top 1,800 lines. It outsourced the responsibility for the remaining 18,000 lines plus secondary sourcing for the top 1,800 lines to ChemCo. The 'source' activities varied in line with the 'make' activities they supported. For CleanCo this was a raw material supply base of 146+ suppliers for components ranging from cardboard boxes to tallow. For 4PLElecCo it was the services of an ElecCo designated inbound carrier – InboundCo. For PharmaCo it was the 200+ medical suppliers who provided product to their internal dispensing warehouse, and managing the services of MedLogCo a specialist medical logistics provider whom PharmaCo encouraged the medical suppliers to use.

7.2.3 Case Focus

As illustrated in figure 7-2 the scope of the three case studies varied depending on their role and position in the supply chain.

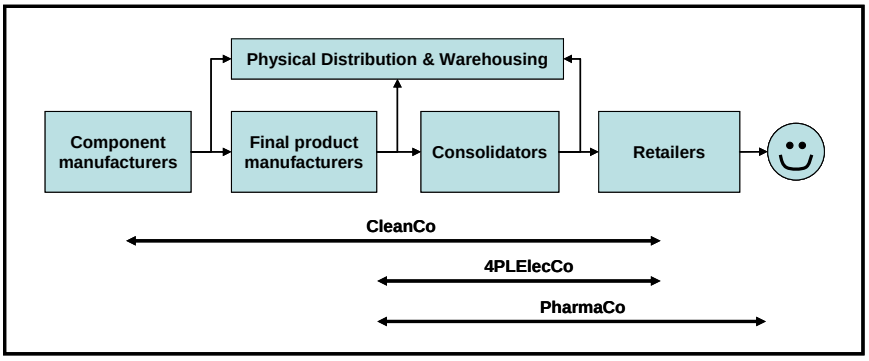


Figure 7-2: Comparison of the supply chain scope for the three case studies

The scope of the CleanCo case study reached from the retailer (predominantly UK grocery retailers and pharmacies) back to raw component manufacturers. The 4PLElecCo case also started with the retailer (in this case the SPs and EDPs) and the scope stretched back to the receipt of product by InboundCo from the Strategic Logistics Centres (SLCs) that received cartons from the ElecCo manufacturing sites. 4PLElecCo was intentionally given no visibility of ElecCo's manufacturing operations as ElecCo wanted to limit the power and hence control of its outsourcing partners. Similarly, the medical suppliers' manufacturing processes were out of the scope of the PharmaCo case. The scope of the PharmaCo case started with the in-store pharmacy dispensing product to the patient and ended with the inbound carrier MedLogCo.

Given the size and complexity of the supply chains being studied, a research focus was identified for each of the case studies. In all three cases the business and category selected was the most strategically important to the business division. Two products / services were selected that represented polar extremes in the product portfolio. In terms of channel selection, there was some manipulation involved at this stage and it was affected by access to end customers. CleanCo wanted a focus on the national accounts as these were the key accounts. ElecCo would not permit access to the top 100 SP accounts and would only grant access rights to the EDPs. PharmaCo wanted a comparison of the PharmaCo and ChemCo supply chains but for reasons of commercial sensitivity did not want us to have direct access to ChemCo. In terms of the customers, and given the channel constraints, it was possible in all three cases to gain access to at least two companies that provided a contrast in terms of their strategy. For CleanCo

this was the difference between a volume and value driven retail strategy; for 4PLElecCo, the contrast between a single customer and multiple drop off 'opt in' customers, and the secondary contrast with an 'opt out' customer; for PharmaCo this was the comparison between an 'out of town' and a 'high street store'. These comparators are very different and reflect the context-specific nature of the supply chains being studied. The final parameter in the research focus was suppliers. This obviously varied depending on the scope of the supply chain. For CleanCo it was two component manufacturers, for 4PLElecCo it was the designated inbound carrier, InboundCo, and for PharmaCo the inbound medical supplies carrier, MedLogCo.

Parameter	Operating Business		
	CleanCo	4PLElecCo	PharmaCo
Business	Consumer	ElecCo supply chain	PharmaCo
Category	Toiletries	EMEA	Health & Beauty
Sub-sector	Washing & Bathing	EU15/2	Dispensing
Product / Service	Commodity product (bar soap) Innovative product (aerosol)	'Opt in' and 'Opt out' delivery solutions	Standard vs. special
Channel	National accounts	ElecCo Authorised Dealers (EAD)	PharmaCo vs. ChemCo
Customers	1 national account with volume driven strategy – VolCo 1 national account with margin driven strategy – ValCo	2 'opt in' – OptIn1 and OptIn2 1 'opt out' – OptOut	'Out of town' vs. 'high street' stores
Suppliers	Supplier 1 ('commodity' packaging) Supplier 2 ('innovative' closures)	Inbound logistics – InboundCo Outbound logistics – OutboundCo1, OutboundCo2, OutboundCo3	MedLogCo

Table 7-3: Comparison of the research foci for the three case studies

With the comparison of the case contexts complete the backdrop is now in place to contrast the contents and outputs from the three case studies.

7.3 Content and Outputs

This section focuses on providing the comparative case data that will provide a response to research questions CS1 and CS3 – the descriptive 'what' questions. Section 7.3.1 compares the drivers of market segmentation strategy across the three cases and section 7.3.2 their supply chain strategies.

7.3.1 Market Segmentation (MS) Strategy

As illustrated in table 7-4, the primary bases of segmentation for both CleanCo and 4PLElecCo / ElecCo EMEA SC were account value. Account value was used to identify a limited number of accounts that had the largest sales turnover. CleanCo used this segmentation to effectively determine the amount of sales support that the account would receive. 4PLElecCo used account value to identify the clients for whom it was willing to develop a fully customised SC solution. For these accounts – including the ElecCo EMEA SC – the segment size was essentially one. ElecCo also used account value to determine the customers it would deal directly with vs. those that it would engage with via a re-seller. Whilst the primary means of segmentation was common, the secondary means were much more context-specific with PharmaCo using retail type, 4PLElecCo sector, and ElecCo channel type.

Firm	Bases of Segmentation			
	Primary		Secondary	
	Bases	Example	Bases	Example
CleanCo	Account Value	Top 13 accounts by account value	Retail type	Neighbourhood retail, discount, pharmacy
4PLElecCo	Account value	Top 3 accounts by account value	Sector	ICT, telecommunications, automotive, healthcare and luxury goods
ElecCo EMEA SC	Account value	Vertical or channel	Channel	EDP, EAD
PharmaCo	Store format	Destination, High Street, city centre etc.	Script type	Acute or repeat (PCS & MDS)

Table 7-4: Comparison of the bases of segmentation across the three case studies

PharmaCo did not use the equivalent bases of store value as a method of segmentation; it used the more customer focused criteria of store format. PharmaCo had discovered from a dispensing perspective that there was a link between the store format customers' buying behaviour for prescription medicines. This linked to the secondary bases of segmentation – script type. For instance, in high street stores there was a high percentage of repeat prescriptions whereas the demand in destination stores was skewed towards acute scripts. As illustrated in table 1-5, PharmaCo was the only case study where customers (in its case stores) were segmented based on buying behaviour and hypothesis HSC1 was accepted. The account driven approaches in the CleanCo and 4PLElecCo case studies led to the rejection.

Case study	HSC1 *'Customers are segmented based on buying behaviour driven by an understanding of customer value'*	
	Accepted / Rejected	**Reasons**
CleanCo	Rejected	• Customer segmented based on account value which had no relationship to buying behaviour
4PLElecCo	Rejected	• Customer segmented based on account value which had no relationship to buying behaviour
PharmaCo	Accepted	• Different formats of store clearly attract customers with different buying behaviours

Table 7-5: Evidence to accept / reject hypothesis HSC1

7.3.2 Supply Chain (SC) Strategy

The supply chain strategies of the three case studies are compared in table 7-6.

Core Process		Current explicit driver of differentiation					
		CleanCo		4PLElecCo		PharmaCo	
		Primary	Secondary	Primary	Secondary	Primary	Secondary
Plan		None	None	Product type (customised or standardised cartons)	None	Product type (standard vs. special)	None
Source		Category (loosely aligned to Kraljic)	Item specific requirements	EU 15/2 or RMEA	Inbound or ELC/Outbound	Product category (Branded, PI, Generic)	None
Make		Product type (liquid, soap, aerosol)	Make or Buy	Product type (customised or standardised cartons)	Special projects	Temperature regime (ambient vs. temperature controlled)	Replenishment type (MTS or standard replenishment)
Deliver	Customer	Lead time (1 day or 3 day)	None	Opt In / Opt Out	Service level (24 hour or 3 day)	Lead time	None
	Warehouse / ELC / DC	Export order	Customer account	Service level (24 hour or 3 day)	Type (carton / pallet) and geography (route)	Replenishment type (x-doc, pick from stock)	None
	Haulier network	Lead time (1 day or 3 day)	None	Hub	Service level	RDC	Store

Table 7-6: Comparison of the explicit drivers of differentiation within the core supply chain processes

CleanCo lacked a holistic supply chain strategy and instead had a series of functional strategies that had limited connectivity. In comparison, both 4PLElecCo and PharmaCo

had developed holistic supply chain strategies in response to a particular customer need and clearly understood what drove differentiation in each of the core processes. Taking each of the core processes in turn, a common decision making criterion in the 'plan' process is demand type. When demand is stable, production plans can be generated using statistical forecasting techniques, and the recommendations accepted/rejected by the planner. This is the way that PharmaCo operated for standard products, 4PLElecCo for customised cartons, and CleanCo tried to operate. The approach was less successful for CleanCo as it failed to segregate the more variable volatile demand for promotional products from the underlying stable demand. PharmaCo and ElecCo, however, did segregate volatile demand. PharmaCo did not use its formal planning approach for 'special' products, instead it responded to demand as it occurred. A similar approach was taken by 4PLElecCo for special projects.

In terms of sourcing strategy CleanCo and PharmaCo explicitly used the Kraljic matrix as a way of identifying the most relevant sourcing strategy for different product categories. They found this an effective way to manage a large portfolio of suppliers. In contrast, ElecCo implicitly used Kraljics' principles when determining its outsourcing strategy for the EMEA supply chain. It did not want to create a situation where an outsource partner became a bottleneck or strategic / critical supplier as this would erode ElecCo's bargaining power. Instead, ElecCo developed a dual source strategy which created a degree of co-opetition between the two providers and kept them both firmly in the leverage box. Whilst this was advantageous for ElecCo commercially. it also created artificial divides in the supply chain which on occasion could be counter-productive.

From a 'make' perspective both CleanCo and 4PLElecCo used product type as the primary driver of differentiation. 4PLElecCo identified special projects as a secondary driver as they required a more customised service. This service was only offered to service provider customers who specifically requested it and the customised solution had to be agreed with ElecCo both in terms of service provision and cost. The equivalent for CleanCo was promotional products, though they did not overtly make this distinction. PharmaCo had a highly standardised operation in the dispensing warehouse and all the processes were identical. The only differences were in the type of crates and storage used both in the dispensing warehouse and across the supply chain. This was driven primarily by a product temperature regime and on the outbound side by the need to segregate MDS product.

Common themes to the 'deliver' processes were service level and lead time. All three companies offered their customers a choice of lead times. CleanCo and 4PLElecCo both offered an express or 3-day service. Express for CleanCo was same day for orders received by 10am, for ElecCo customers it was 24 hours from receipt at ELC. The contrast is that CleanCo was actually measuring the lead time from order to receipt whilst the 4PLElecCo target was an internal supply chain measure. Like CleanCo, PharmaCo offered its stores the opportunity for same day deliveries. Orders received by 11am were in store by 3pm that afternoon. Given the strict government lead time targets, the maximum lead time for a standard script was 24 hours. The remaining two service options for PharmaCo stores both met this deadline. The exception was special products which had a lead time between 24 hours and 6 weeks, depending on the

product and degree of customisation. Similarly, the lead time for ElecCo's special projects was also negotiated independently of the standard service levels. One distinguishing feature of the 4PLElecCo case was that it offered ElecCo customers the opportunity to 'opt out' of the standard service propositions and select their own logistics provider. 20% of customers chose to do this which perhaps indicates that ElecCo did not fully understand what their customers actually valued.

Both 4PLElecCo and PharmaCo had holistic supply chain strategies that responded directly to customer needs, providing continuity between the management decisions made within each of the core supply chain processes. This means that, as illustrated in table 7-7, hypothesis HSC2 was supported for these case studies. In contrast, CleanCo had a disparate collection of functional strategies that linked both customer focus and an overarching strategy and HSC2 was therefore not supported. Linking the supply chain strategy to business context, both 4PLElecCo and PharmaCo had the opportunity within the last 5 years[99] to design their supply chain strategy. For 4PLElecCo this was totally from scratch in response to winning the business of a new client – ElecCo. For PharmaCo it was driven by the opportunity to centralise and consolidate the dispensing warehouse onto the main PharmaCo site.

Case study	HSC2 *'Supply chain strategy is developed in response to the customer segmentation strategy'*	
	Supported / Not Supported	**Reasons**
CleanCo	Not supported	• No holistic SC strategy • Only the deliver core process had a connection to the customer segmentation strategy, and given the low take up of the QR service (1/10 national accounts) it would not appear to have been developed in response to customer needs
4PLElecCo	Supported	• ElecCo as a top 3 account had a fully customised supply chain solution to meet their specific needs - ElecCo was a segment of 1
PharmaCo	Supported	• Developed from the customer back • This was to meet both government and patient requirements

Table 7-7: Evidence to support / not support hypothesis HSC2

4PLElecCo chose a highly outsourced model to provide supply chain flexibility, whilst PharmaCo opted for a dual in-source / outsource strategy. At the time of the case study, CleanCo had not re-visited their supply chain strategy in such a holistic way and were, to an extent, bound by their traditional mode of operation. The question emerges; 'at what point does a supply chain require a wholesale re-design rather than incremental improvement?'

7.3.3 Performance Measures

As illustrated in table 7-8, the more holistic supply chain strategies of 4PLElecCo and PharmaCo were underpinned by a BSC approach to performance measurement. This approach seeks to align the organisation to a common set of business objectives by balancing financial measures with a broader set of measures that include operational excellence, customer satisfaction and people. 4PLElecCo and PharmaCo both had a clear set of logistics / supply chain priorities around which the BSC was developed. 4PLElecCo drove the consistent application of this approach across the supply chain through a system of daily, weekly, monthly and quarterly reviews. The focus was not

[99] Last 5 years from the point at which the case study took place

only on absolute performance but using the metrics to drive improvement across the supply chain.

Company	Type of performance measurement system	Focus	Clearly defined SC/ logistics priorities	Consistent application across the SC	Review period	Linked to performance improvement activities
CleanCo	WCM	Operational Excellence	No	No	Monthly	No
4PLElecCo	BSC	Operational Excellence Customer Satisfaction Financial Performance People (lesser focus)	Yes	Yes, highly co-ordinated approach, driven by 4PLElecCo	Daily, weekly, monthly, quarterly	Yes (root cause identification & performance improvement projects)
PharmaCo	BSC	Operational Excellence Customer Satisfaction Financial Performance People	Yes	Yes at senior management level, but dual system at operational level.	Monthly	Yes (issue management process)

Table 7-8: Comparison of performance systems

Root cause analysis drove these improvements and more substantial improvements were formalised into project proposals for approval by ElecCo. The PharmaCo approach was less well developed. The formal review process only took place on a monthly basis, and there was no consistent approach to daily and weekly reviews. There were also issues with relevance of data as the BSC was cascaded to the process level within the SC. Measures that were useful to the senior management team were often at a level of aggregation that did not help process managers make meaningful operational decisions. This led to a dual system of metrics at a process level whereby WCMs were used to make management decisions and the BSC for management reporting. PharmaCo also used the BSC to drive performance improvement through a system of issue management. In contrast CleanCo had a fragmented approach to performance measurement focused on functional WCMs of operational excellence. There were no clearly defined logistics or supply chain priorities and the measures were not consistently applied across the supply chain. The measures were reviewed on a monthly basis by the senior management team but were not explicitly linked to a process of performance improvement.

A benefit of the BSC approach is that it helps the supply chain to achieve a balance between business (shareholder) and customer needs. It is communicated to the supply chain explicitly through the stated logistics / supply chain priorities and implicitly by the behaviour of the senior management team. 4PLElecCo had developed a robust and effective process for performance review that serviced the needs of their client ElecCo. The measures were therefore determined in conjunction with ElecCo and focused on what was important to ElecCo rather than the broader supply chain. In some instances this created tension as 4PLElecCo could see that decisions which ElecCo were taking destroyed customer value and increased supply chain costs. For instance, ElecCo measured end to end supply chain performance in relation to the customer order date rather than the customer request date. They also increased supply chain costs by manipulating customer orders at the end of financial quarters to demonstrate consistent performance against target to the stock market. It could be argued that the increase in share price of delivering a positive message to the stock market outweighed the increase in supply chain costs and customer complaints – so what is the problem? The issue for 4PLElecCo is that it is given conflicting messages. It is told to reduce supply chain costs and increase customer satisfaction yet the biggest levers that it has to do this are out of its control. The BSC is aligned to ElecCo's perception of customer value, and not the customers themselves. Hence, not only is it important to have a good process but it is important to ensure that it is responding to the right information.

7.3.4 Relationship between MS & SC Strategy

Both the 4PLElecCo and PharmaCo case studies demonstrated a direct link between customer segmentation and supply chain strategy. 4PLElecCo developed a supply chain solution specifically for ElecCo because it was a strategic account. In essence it could be considered as a segment of one. This segmentation was driven by account value and not buying behaviour, and so the 4PLElecCo case did not provide evidence that different behavioural segments drive different supply chain responses. As a result, as illustrated in table 7-9, hypothesis HSC3 was only partially supported. In contrast, PharmaCo demonstrated a direct link between the store segmentation strategy, buying behaviour and supply chain strategy and HSC3 was supported.

Case study	HSC3 *'There is a direct link between customer segmentation and supply chain strategy. Different behavioural segments drive different supply chain strategies.'*	
	Supported / not supported	**Reasons**
CleanCo	Rejected	• No link found • Segmentation not based on behavioural segmentation and no holistic supply chain strategy
4PLElecCo	Partially accepted	• Accepted – the supply chain strategy was specifically developed for the ElecCo account (a segment of one) . ElecCo has developed its service propositions to meet the needs of the tier 1 and 2 customers with whom it deal directly. • Rejected – not driven by behavioural segmentation. Responsive to the needs of ElecCo but not necessarily its customers.
PharmaCo	Accepted	• Direct link between store segmentation and customer buying behaviour which in turn drove the supply chain strategy • A one-to-many link was found between the behavioural segments and supply chain strategies

Table 7-9: Evidence to support / not support hypothesis HSC3

PharmaCo had multiple supply routes for its prescription medicines and these routes were available to all pharmacies. The pharmacist had autonomy to make the stock and sourcing decisions to ensure that 98% of scripts could be fulfilled from stock, and the remainder within 24 hours. Depending on the context the pharmacist would flex the supply route. For instance, the predominant supply route for a top 1,800 product supplied as part of a repeat prescription requirement would be through the PharmaCo supply route, but if at the time the order was placed there was no stock in the dispensing warehouse it could be ordered from ChemCo. The relationship between buying behaviour and supply chain strategy was therefore one-to-many.

Hypothesis HSC3 was not supported for the CleanCo case study as there was no evidence of a link between market segmentation and supply chain strategy. Such a link would have been difficult, given their account value based approach to segmentation and the absence of a holistic supply chain strategy.

7.4 Underlying Mechanisms

A core element of the critical realist and design science epistemology is the identification of the underlying mechanisms which seek to explain why the observed content and outputs have developed. This section provides a comparison of the underlying mechanisms identified from the three case studies. Section 7.4.1 begins with a review of contextual factors that have driven the development of CRSC and the similarities and differences of their effect on the three case studies. Section 7.4.2 is more introspective and focuses on understanding how the three identified mechanisms

(organisational design, performance measurement and information systems) have had an enabling or inhibiting effect on the development of CRSC in the three case studies.

7.4.1 Contextual factors

The case studies identified seven contextual factors that can drive the development of CRSC strategy; globalisation, outsourcing, demand fragmentation, market polarisation, relative size, global economic cycles and government regulation. As illustrated in table 7-10, the first five factors had an impact on all three cases, whilst global economic cycles and government regulation only had major impacts on 4PLElecCo and PharmaCo respectively. Whilst the drivers appear generic their application is specific to the supply chain context in which they operate. There appear to be two stances that can be taken by the drivers of globalisation and outsourcing; a proactive stance as taken by 4PLElecCo whereby these drivers shape the supply chain strategy and become an integral part of the business model, or a reactive and slightly defensive position as adopted by CleanCo. This would appear to link to the stage of the company life cycle. 4PLElecCo was a young company that was starting afresh and could develop a new business model to meet the needs of the new economy. CleanCo was a company with more than 100 years of history, longevity of workforce and an ageing infrastructure. PharmaCo was also a company steeped in tradition and heritage. In the last five years PharmaCo was also able to refresh its supply chain strategy and to a certain extent has developed a hybrid model that gives it the best of both worlds. This demonstrates the major impact that the context has on the drivers. A common theme across the three cases was the fragmentation of demand. For CleanCo, as a manufacturer, this predominantly meant an increase in the number of SKUs, whereas for 4PLElecCo and PharmaCo it meant an increase in the range of services they offer.

SC Drivers	Impact		
	CleanCo	**4PLElecCo**	**PharmaCo**
Globalisation	Introduction of bar soap manufacturing facility in FE	Business model developed to reflect the global nature of the business	Manufacture of generics is transferring to developing countries
	Migration of 2 key brands from local to global brands		
	Regional/International purchasing contracts		
Outsourcing	Spare capacity in the bar soap plant in UK	Integral part of the global business model	Hybrid sourcing strategy
	Increased usage of 3rd party manufacturing across Europe / World		
Fragmentation	Increased number of SKUs	Increased demand for customised services	Increase in the range of services offered to the customer
Relative size	Relationship with customers and suppliers	ElecCo is a prestigious global account	25% UK market
Market polarisation	Demise of the middle market in developed countries. Replaced by increased demand for products that are obviously VFM or premium.	Both ElecCo and 4PLElecCo only deal with 'high end' customers	Generics vs. branded products
Global economic cycles		The upturns are large, but demand can drop away overnight	
Government regulation			UK government is the ultimate customer

Table 7-10: Supply chain contextual drivers and their impact

In a supply chain context 'size does matter'. CleanCo has increasingly become a victim of its relatively small size when dealing with the UK retailers. In contrast 4PLElecCo, ElecCo and PharmaCo have all been able to use their relatively large size to their own advantage. This seems particularly important in terms of bargaining power vis-à-vis customers and suppliers.

The impact of market polarisation impacted the three case companies in different ways. For CleanCo it had a major impact on their product positioning (make), for 4PLElecCo it was an integral part of their strategy as they chose only to deal with clients at the 'high end' and for PharmaCo it affected their sourcing strategy (source).

The contextual factors have a major impact on the development of CRSC strategy. Whilst the terms appear generic their impact is specific to the supply chain context. In line with the design science approach (van Aken, 2001) these factors will play an important part in determining the strategic framework and guiding principles that underpin the development of CRSC strategy. This will be discussed in more detail in section 9.2.

7.4.2 Enablers and Inhibitors

Within the internal – supply chain – context there are a number of factors that can enable or inhibit alignment. Four types of alignment were identified through the case studies; strategic, internal, external and end-to-end (e2e). Table 7-11 provides a summary of the degree of alignment found across the three case studies based on an analysis of the enablers / inhibitors. It was found that CleanCo had poor alignment across all four categories. 4PLElecCo had good e2e and internal alignment, but strategic and external alignment was more neutral. This was due to the controlling nature of ElecCo.

Type of Alignment		Status		
		CleanCo	4PLElecCo	PharmaCo
Strategic Alignment		☹	😐	☺
Internal Alignment	SMT & SC	☹	☺	☺
	Commercial & SC	☹	☺	☺
	Core SC processes	☹	☺	☺
	SC & internal customer	NA	NA	😐
External Alignment	Client	NA	😐	NA
	Customers	☹	😐	☺
	Suppliers	😐	😐	☺
End to End SC Alignment		☹	☺	☺
Overall degree Alignment		**L**	**M**	**H**

Table 7-11: Comparison of the degree of alignment

From a strategic perspective, alignment was inhibited by ElecCo's pursuit of business objectives at the expense of the customer and the broader supply chain. ElecCo also orchestrated the development of a supply chain that was highly responsive to its needs but not necessarily the needs of the end customer. From a supplier perspective the 'co-opetition' ElecCo created between InboundCo and 4PLElecCo was divisive and created artificial divides in the supply chain. PharmaCo generally had good alignment in all

four areas. Their one area for improvement was the alignment between the SC and internal customer, where it was perceived that particularly for the PharmaCo dispensing supply chain the operating hours were becoming increasingly out of sync with store opening hours.

The enabling / inhibiting factors that contributed to the alignment were analysed based on Schein's (1992) levels of culture. The resulting framework had three levels or layers.

- **Artefacts**: the outer, visible layer with its organisational structures and processes, and group behaviours
- **Assumptions**: the hidden, heart layer with its unconscious, taken-for-granted beliefs, perceptions, thoughts and feelings. The source of values and action
- **Mechanisms**: the middle layer which seeks to find the underpinning enablers that link the underlying assumptions to the visible behaviour

The majority of factors were identified either as assumptions or artefacts. These are case specific and difficult to replicate. As illustrated in table 7-12, there were some common themes to the more positive assumptions that underpinned the 4PLElecCo and PharmaCo supply chains. This includes being both business and customer focused, and disciplined / process orientated.

Assumptions		
CleanCo	**4PLElecCo**	**PharmaCo**
• Fear of failure • Maintain status quo • Silo mentality • Respect authority	• Process orientated • Drive for standardisation • ElecCo makes the decisions • Business focused • Customer orientated	• Discipline • People trust us • Pharmacy at heart of every store • Business focused • Customer orientated • Tradition / heritage

Table 7-12: Comparison of the embedded assumptions (after Schein (1992))

The mechanisms emerged as the link between the assumptions and artefacts. From a critical realist/ design science perspective these are the crucial elements in the development of a framework for customer responsive strategy. They are the levers by which the underlying assumptions and hence the artefacts within an organisation can be changed. Three mechanisms were identified from the case studies: organisational design, performance measurement and information systems. If used in a positive way these levers could also be considered as VRIN resources. Table 7-13 provides a summary of the way in which these mechanisms were used to enable or inhibit CRSC strategy; inhibitors are depicted in red, and enablers in black. In CleanCo the mechanisms were being used in an inhibiting way. In 4PLElecCo they were generally enabling CRSC strategy. Each mechanism did have an inhibiting factor and there was a common theme between them – the controlling nature of ElecCo. PharmaCo also used the mechanisms to enable customer responsiveness, though there were some small areas for improvement associated with its use of information and performance measurement systems.

Mechanisms	Enabler / Inhibitor		
	CleanCo	4PLElecCo	PharmaCo
Organisational Design	• Hierarchical • Command and control • Functional	• Virtual – outsourced • Inbound: ELC/Outbound split • Flat management structure • Small dedicated team • High degree SC expertise • Flexible & responsive • Co-location	• Hybrid design • Clear roles & responsibilities • Boundary spanning roles – supply team • Flexible & responsive • Co-location • Job rotation
Performance Measurement	• Developed functionally • No central review mechanism • Lacks customer focus • Lacks business focus • Different units of measure	• BSC approach used across SC • Daily, weekly, monthly and quarterly review • Exception management • Drives performance improvement • Projects approved by ElecCo	• BSC approach used across SC • Standardised monthly review • Issue management • Dual KPI system at grass roots • Some conflicting measures
Information Systems	• Disjointed • Lacks discipline • Poor data accuracy • Not timely • Poor visibility	• Integrated system • Disciplined • Accurate and timely data • Potential to provide e2e SC visibility – limited by ElecCo	• Real time systems • Accurate & timely data • Disciplined • PharmaCo ordering system is old and more difficult to use than ChemCo system • EDI

Table 7-13: Comparison of the enabling / inhibiting effect of the generative mechanisms (after Schein (1992))

7.5 Potential for Improved Customer Responsiveness

The three case studies provided three very different lenses on the subject of CRSC strategy. As illustrated in table 7-14, the degree of alignment and customer responsiveness varied across the cases as did the potential for improvement. CleanCo has a low degree of alignment, low customer responsiveness and hence high potential for improvement. Suggestions for improvement lay in the adoption of a customer centric supply chain strategy driven by customer segmentation primarily driven by retailer strategy, but enabled by the separation of promotions as a separate segment. In contrast PharmaCo had already achieved a high degree of alignment, high customer responsiveness and therefore the potential for further improvement was relatively low. Suggestions for improvement lay in addressing the inhibiting aspects of the mechanisms as summarised in table 7-14.

Case Study	Degree of Alignment	Customer Responsiveness				Potential for Improvement	
		HSC1	HSC2	HSC3	Degree	Degree	Suggested Improvements
CleanCo	L	N	N	N	L	H	• Segment customer primarily based on retailer strategy (volume vs. value driven) • Secondary segmentation based on 'push' vs. 'pull' demand (discount vs. EDLP) • Isolation of promotions as a separate segment
4PLElecCo	M	N	PS	S	M	M	• Three-pronged approach to logistics services based on customer needs: o Standard service o Customised service o Fully customised service • Enhancements to standard service based on solutions summarised in table 5-18
PharmaCo	H	S	S	S	H	L	• Improvements to the information and performance measure systems to overcome the inhibiting effects summarised in table 7-13

Key: S - Supported, PS = Partially Supported, N = Not Supported; H = High, M = Medium, L = Low

Table 7-14: Comparison of the potential for improved customer responsiveness

4PLElecCo's management of the ElecCo EMEA supply chain occupied the middle ground. Overall alignment was medium, as was the degree of customer responsiveness and opportunity for improvement. The primary improvement was to allow the supply chain to respond to actual customer needs rather than those as defined by ElecCo. A three-pronged approach to the logistics strategy was proposed that built upon 4PLElecCo's strengths in process standardisation and special projects. It included the development of the current gold and platinum standard serviced based on a range of improvements outlined in table 5-18. The special projects provision remained as a fully customised service, as this enabled 4PLElecCo to stay close to the customer and was potentially a route for developing the service solutions of the future. A new segment was created called 'customised service'. This was a range of new standard services developed to meet the most common requests for customisation.

The potential for improved customer responsiveness by adopting a customer driven approach to the supply chain exists in all three cases. The degree of improvement varies depending on current performance, but in both the CleanCo and PharmaCo cases this would require some modification to the existing bases for customer segmentation. Segmenting customers in a way that is meaningful to the supply chain is very context specific. The approach used by PharmaCo is very different from those proposed for CleanCo and 4PLElecCo. Identifying the right bases for segmentation is therefore a major challenge in the development of CRSC strategy.

7.6 Chapter Summary

This chapter presented a comparison between the case data presented in chapters 4, 5 and 6 to begin to identify the underlying mechanisms and guiding principles that underpin the development of CRSC strategy.

The cross-case analysis concurs with the view of Pettigrew (1992) that an understanding of the context (business and supply chain) is crucial to developing an understanding of the external and internal drivers of supply chain strategy. The contexts in which the three supply chains operated were very different, including: CleanCo – a relatively small, UK manufacturer of toiletries and detergents; 4PLElecCo – a relatively large LLP managing the EMEA supply chain for a global manufacturer of electronics; and, PharmaCo – a large UK retailer of health and beauty products.

Other notable differences in context included the scope and supply chain design, with some variation between the three cases. Despite these differences it was possible to identify seven generic contextual factors (globalisation, outsourcing, fragmentation, relative size, market polarisation, global economic cycles and government regulation) that had an impact on the development of CRSC strategy. Three underlying mechanisms were also identified (organisational design, performance measurement and information systems) that act as the levers for enabling, or inhibiting, alignment across the supply chain. A link was found between the degree of alignment and degree of customer responsive practices found within the supply chain; the greater the degree of alignment, the greater the degree of customer responsiveness. Potential for future improvement was found in all three cases, with the potential being greatest where evidence of alignment and customer responsive practices were low. Where behavioural segmentation was not evident (CleanCo and 4PLElecCo) suggestions for improvement

hinged around its adoption. The identification of the right bases of segmentation is context-specific and therefore poses a major management challenge in the development of CRSC strategy.

The foundations are now in place to discuss the key findings and contribution of the research in chapter 8.

8 Conclusions

8.1 Introduction

'People do not like to think. If one thinks, one must reach conclusions. Conclusions are not always pleasant'

Helen Keller (1880-1968)

Thought does indeed lead to conclusions, and as Keller rightly points out these are not always pleasant. The process of bringing the outcome of the author's work over the last seven years to a conclusion has been difficult at times but never unpleasant. The conclusions, particularly from individual case analysis on occasion presented uncomfortable truths – for instance ElecCo were embarrassed by their pdate performance. The final conclusions from the studies for this thesis are unlikely to offend. They are built upon a detailed review of the underpinning literature and have sought through empirical research to address specific gaps in the knowledge surrounding the development of CRSC strategy in a robust and rigorous way. This foundation upon which the research findings are based is reviewed in section 8.2, before presenting a summary of the main findings in section 8.3.

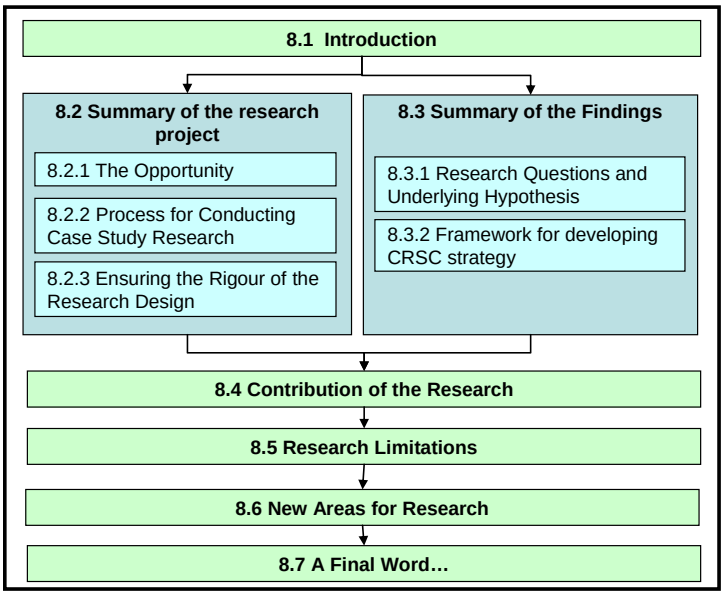


Figure 8-1: Structure for Chapter 8 (Conclusions)

The appeal of the design science epistemology is that it actively encourages the interplay between research and practice, something close to the author's own heart. The studies for this thesis would not be complete if their impact was not relevant to both the academic and practitioner communities. Section 8.4 reviews the contribution of the research and its impact on the development of theory and practice. One of the occupational hazards of management research, stated at the start of chapter 3, is that it raises more questions than answers. Section 8.5 reviews some of the areas for future research that have emerged from this research. The thesis is then brought to a close in section 8.6, with some reflections on the current state of CRSC strategy.

8.2 Summary of the Research

The summary of the research comprises three key elements. Firstly, a review of the opportunity or research gap is presented in section 8.2.1, before the process for conducting the research is recapped in section 8.2.2. This section is brought to a close by revisiting the tactics employed during the research studies to address the rigour and relevance of the results.

8.2.1 The Opportunity

The concept of the supply chain, rather than a set of independent functions, was first proposed by Oliver & Weber in 1982. Over 25 years later many organisations still struggle to make the 'supply chain' a reality. It is a field of study that is hindered by a lack of consensual definition (Burgess, 2006), limited empirical evidence, and studies limited in scope to dyadic relationships. The supply chain is not alone in these limitations; as presented in chapter 1. An underpinning body of knowledge − manufacturing strategy − has suffered from the same problems. The development of this strategy was further impeded by the impact of trade-offs between manufacturing and marketing priorities (Shapiro, 1997; Crittenden, 1991). This problem has continued to affect supply chain strategy theory development and was one that was of particular interest to the author having seen its impact first hand as a manager at Dyson.

As presented in chapter 2, a further limitation of research into both manufacturing and supply chain strategy is its product-centric approach to strategy formulation. Hill (1985), Fisher (1997), Christopher & Towill (2000) all base their approaches for strategy development around the product. Approaches have become more sophisticated and no longer believe that there is a 'one size fits all' approach. Instead researchers suggest normative approaches commonly based around two-by-two matrices that link product demand characteristics to a particular supply chain strategy. This has been useful in clarifying the positions of the so called 'lean' and 'agile' approaches to supply chain strategy, but is not particularly customer responsive.

The work of Gattorna and Walters (1996) was an important breakthrough in the development of CRSC strategy. They suggested that customers should be grouped or segmented based on common buying behaviour, and a supply chain strategy developed in response, thus drawing together segmentation and supply chain strategy in a holistic way. Conceptually strong, the strategic alignment model lacked detail of how it would be implemented in practice, and empirical data were scarce and largely based on the retrospective application of the model to public domain cases.

The opportunity therefore existed to carry out empirical research, in a supply chain context that reached beyond the dyad, looking at the link between customer segmentation and supply chain strategy. Whilst the literature did not reveal the 'ideal' framework for developing CRSC, seven core principles did emerge. This supported the development of an emerging theoretical framework. The challenge was to develop an appropriate research design that built upon this emerging framework that also addressed the limitations of previous studies.

8.2.2 Process for Conducting Case Study Research

As mentioned in chapter 3, the foundation of an effective research design is alignment between the research problem, the research design and, in an ideal world, the researcher's view of reality. From this perspective, the studies for this thesis are on a solid foundation. The author's education in the UK was heavily influenced by Parmenidean-thinking; an ontology 'of being', based on a view that reality is permanent and unchanging (Chia, 2002). This has become the dominant paradigm that underpins the author's view of reality. Her epistemological position is one of critical realism (Bhaskar, 1977). Bhaskar believes that there is a difference between a causal law and a pattern of events. Like the layers of an onion, critical realism is based on different layers of reality (empirical, actual and real) which can be revealed through the systematic application of science (Chia, 2002). This aligns with the author's views of management research as a design science (van Aken, 2001), which seeks to solve problems or make improvements by understanding the underlying rules or mechanisms, whether these are directly observable or not. By applying a critical realist epistemology to these doctoral studies, the author cycled through two of the three research stages (description and explanation as identified by Meredith et al. (1989). The descriptive phase was used to capture observations (empirical/actual domains) about the current state of CRSC strategy. The explanatory phase was used to develop the frameworks and guiding principles (real domain) to try and explain why the current state exists.

Given that the objective of this thesis was to empirically study the contemporary phenomenon of CRSC strategy formulation, a phenomenon that is difficult to distinguish from its organisational context – the supply chain – there was a good fit with case study methodology as defined by Yin (1994). As demonstrated by the three case studies, the contexts in which supply chains operate are truly complex, spanning both internal and external organisational boundaries. This complexity, coupled with the paucity of theory, lack of well-supported definitions and metrics, adds further support to a case research methodology (Eisenhardt, 1989; Stuart, 2002; Harrison, 2002). Case study research also fits well with the exploratory 'what' and explanatory 'why' questions around which this thesis research was based. These will be discussed in more detail in section 8.3.

Even within the bounds of case study research there are several different types of case study design. The favoured approach for these studies was a multiple case study design, an approach also favoured by van Aken (2004). The strength of multiple case study research is that it provides theoretical or literal replication (Yin, 1994) of results. This is often considered more compelling and the overall study is regarded as more robust (Herriott, 1983). Given the context-specific nature of SCM, literal replication is unlikely and hence the research design sought to provide an opportunity to look for theoretical replication of the guiding principles and generative mechanisms that underpin the development of CRSC strategy.

An important part of ensuring the rigour of the research design was to have a well defined framework around which it was based. Having compared the empirical research processes proposed by Flynn et al. (1980), Yin (1994) and Stuart et al. (2002), a five stage (define research parameters, instrument development, data gathering, data analysis, dissemination & theory development), three phase research design (pilot case,

core cases, cross-case comparison) was developed for the research. Given the importance to this thesis, this is re-presented in figure 8-2 (originally presented in chapter 3, figure 3-4).

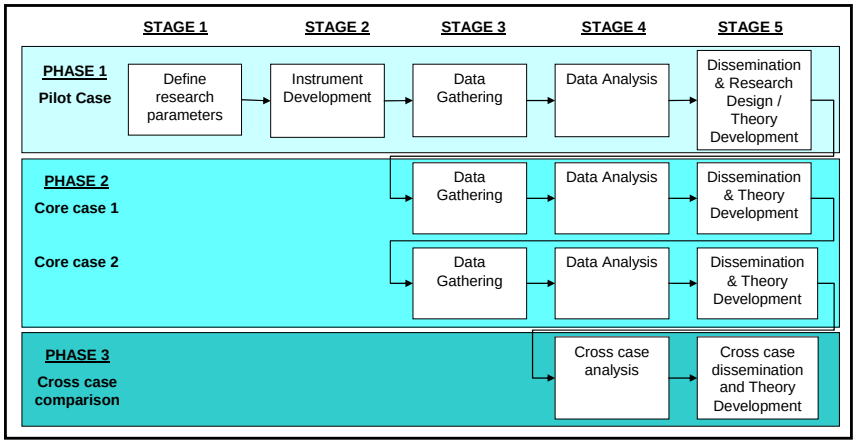


Figure 8-2: Combining the phases and stages of the research design

This framework provided the backbone for the detailed development of the research design. Stage one included the development of the research questions, supporting hypotheses and defining the unit of analysis, Stage two the development of research instruments. The primary research instrument used was semi-structured interviews supported by secondary data sources where appropriate. As advised by Yin (1994), a case study protocol was used to increase the reliability oftheresearch and, given that the author was using a multiple case design, it was considered essential. The protocol forced the development of a consistent approach to the field procedures, interview protocol and reporting protocol that was used across all three phases of the research design. The third phase was data gathering. Three interdependent principles underpinned this stage (Yin, 1994): use of multiple sources of evidence, creation of a case study database and maintaining a chain of evidence. All three were used and, where possible, synergy sought with the case study protocol. Stage 4, data analysis, was aligned to the reporting protocol and this provided consistency of approach across the three phases. Stage 5 was dissemination. The reporting protocol provided the backbone of the dissemination strategy but it was not the full picture. Given the author's practitioner roots, she also sought more practitioner orientated roots for dissemination and this include the development of a three-day customised executive education programme based on the outputs of the research.

8.2.3 Ensuring the Rigour of the Research Design

The five-stage process (after Flynn et al., 1990; Stuart et al., 2002/9; Yin, 1994) used to structure the methodology provided rigour to the research design. As a final check the author assessed her research against the four basic tests commonly used in empirical research; construct validity, internal validity, external validity and reliability. Yin (1994) suggested a number of tactics that can be used to meet these four basic tests. Table 8-3 (originally presented in chapter 3 as table 3-15) provides a summary of the tactics used in the studies for this thesis. All but one of the tactics suggested by Yin were used, i.e. time series analysis, and that was not used as it was not appropriate to the

field of study. The author believes that everything possible has been done to ensure the rigour and reliability of her research.

Tests	Case Study Tactic	Employed for this thesis	Phase of Research in which Tactic Occurs
Construct Validity	• Use of multiple sources of evidence • Establish chains of evidence • Have key informants review draft case study report	Y Y Y	Data collection
Internal Validity	• Do pattern-matching • Do explanation building • Do time series analysis	Y Y N	Data Analysis
External Validity	• Use replication logic in multiple case studies	Y	Research Design
Reliability	• Use case study protocol • Develop case study data base	Y Y	Data collection

After COSMOS Corporation cited in Yin (1994)

Figure 8-3: Tactics for Ensuring the Quality of the studies for this thesis

8.3 Summary of the Findings

There were four objectives for this thesis:

1. Describe the current state of CRSC strategy formulation
2. Explain why the current state exists in terms of the underlying mechanisms
3. Consider the potential for improving customer responsiveness
4. Compare the underlying mechanisms across the three different supply chain contexts to develop a strategic framework and set of underlying concepts / guiding principles

The purpose of this section is to demonstrate how those objectives have been met. Section 8.3.1 begins with an overview of the current state both in terms of CRSC strategy and underlying mechanisms (objectives 1 and 2). Section 8.3.2 deals with the potential for improving customer responsiveness (objective 3), and section 8.3.3 concludes by presenting a framework for developing CRSC strategy (objective 4).

8.3.1 Current State

The findings from these studies regarding the current state of CRSC strategy are reflected in the four research questions, and three supporting hypotheses summarised in table 8-1.

	Research Question	Hypotheses – The 'ideal'	
CS1	What approaches to customer segmentation and supply chain strategy formulation are currently adopted?	HCS1	Customers are segmented based on buying behaviour driven by an understanding of customer value
		HCS2	Supply chain strategy is developed in response to the customer segmentation strategy
CS2	Why have these approaches been adopted?		
CS3	What is the relationship between current approaches to customer segmentation and supply chain strategy?	HCS3	There is a direct link between customer segmentation and supply chain strategy. Different behavioural segments drive different supply chain strategies
CS4	Why has this relationship developed?		

Table 8-1: Research questions and supporting hypotheses

The descriptive 'what' questions seek to describe the current state, whilst the explanatory 'why' questions uncover the underlying mechanisms. In addressing the current state research questions, the following structure has been followed. Sections

8.3.1.1 and 8.3.1.2 provide an overview of the market segmentation and supply chain strategy respectively, and address research question CS1 and hypotheses HCS1 and HCS2. Section 8.3.1.3 builds upon this analysis and considers the relationship between the current approaches to market segmentation and supply chain strategy, addressing research question CS3 and hypothesis HCS3. Section 8.3.1.4 concludes the analysis of the current state with the focus on the underlying mechanisms which seeks to explain why the current state exists, addressing research questions CS2 and CS4.

8.3.1.1 Segmentation Strategy

Account value was the basis for customer segmentation identified by the study; it was found in two of the three case studies. This had no link to customer buying behaviour and was purely determined on the sales value of the accounts. PharmaCo did not use the equivalent basis of store value as its primary method of segmentation; it used the more customer focused criteria of store format. PharmaCo discovered that, from a dispensing perspective, there was a link between the store format and customers' buying behaviour for prescription medicines. This linked to the secondary basis of segmentation – script type. The secondary bases of segmentation were much more context-specific and, in addition to script type, included retail type and industrial sector.

Hypotheses HCS1:

'Customers are segmented based on buying behaviour driven by an understanding of customer value'

was neither conclusively supported nor rejected. Account value was the prominent method of segmentation identified and this is in accord with the author's broader practitioner and academic experiences. Such an approach to segmentation − logical from a marketing programme perspective − is not helpful in providing a direct connection between supply chain and customer (this will be discussed in more detail in section 8.3.1.3). It suggests that different forms of segmentation may be required. Marketeers may continue to use segmentation based on the principles of key account management to drive their marketing programmes (Wind and Cardozo, 1973; Choffray and Lillian, 1978; Shapiro and Benson, 1984; Sharma and Lambert, 1994; Doyle, 2002) whilst different forms of customer segmentation can be used to drive supply chain. This returns to the roots of segmentation and Smith's (1956) view that segmentation can be used as a tool for addressing marketing and supply chain trade-offs. It also aligns with Porter's (1985) concept of industry segmentation which creates segments based on a combination of buyer behaviour and the behaviour of costs. With no dominant process for segmentation emerging from the research, and given its context-specific nature, the author would support the use of Porter's approach for segmentation (summarised in figure 2-11) as a starting point for companies wishing to develop CRSC strategy. As discussed in section 2.3.3.3, the Porter approach is not normative. It seeks to guide users to compile their own bespoke matrices. The limitation is that there are around 28 suggested bases that need to be evaluated.

8.3.1.2 Supply Chain Strategy

Two of the three case studies had a holistic supply chain strategy and in both those cases this had been developed within the last five years[100]. The Lead Logistics Provider (4PLElecCo) developed a specific supply chain solution for a significant new client, whilst the pharmacy chain (PharmaCo) was forced to rethink its supply chain strategy due a broader business imperative of centralisation. In both cases they conducted the supply chain review from the customer back, and this focus helped to provide continuity between the management decisions made within each of the core supply chain processes. Further continuity was provided by the clear logistics / supply chain priorities that were cascaded throughout the supply chain by the senior management team.

The ability to offer customers a range of lead times was a common theme in all three case studies. In the PharmaCo case (the only company using behavioural segmentation) these were designed to provide the flexibility to meet government and patient lead time expectations in the most cost-effective way. In the other cases the express vs. 3-day offering was somewhat arbitrary and developed by an internal perception of customer needs. Lead time is emerging as a critical driver of supply chain strategy.

From a manufacturing and planning perspective two further drivers emerged:

- Products (either standard or customised)
- Demand (either stable or volatile)

In all three cases there was a differentiation between standard and customised product. This was explicitly understood in 4PLElecCo and PharmaCo who had differentiated 'plan' and 'make' processes to accommodate the difference. It was not recognised by CleanCo who dealt with standard and promotional products in the same way, despite the majority of promotional products requiring promotion-specific packaging, and effectively being made to order. Generally, standard products had a more stable demand pattern than customised products, and this had a direct impact on planning. Stable demand was dealt with using statistical forecasting and MRP techniques, and was quite proactive, whilst variable demand required a more responsive approach which needed a higher degree of human intervention. This was illustrated in the 4PLElecCo and PharmaCo case studies that had developed specialist teams to deal with 'specials'. Hence, from the raft of criteria presented in chapter 3, empirical evidence from the author's studies supports Christopher and Towill's (2002) three dimensional classification (products, demand, lead time) previously discussed in section 2.4.2.3. They used these dimensions to define seven generic pipeline strategies, against which different products were positioned. A more appropriate use of these 'supply chain strategy drivers' would be to use them as a set of factors to be considered on a segment by segment basis to drive a context-specific supply chain response.

Evidence to support hypothesis HSC2:

'Supply chain strategy is developed in response to the customer segmentation strategy'

[100] Last five years from the point at which the case study took place

was found in two out of the three cases and therefore was not fully supported. The two supply chains that did use the customer as a means for developing supply chain strategy had a far greater degree of alignment and increased customer responsiveness as a result.

Evidence from the research would suggest that 'source' strategy was developed relatively independently from the rest of the supply chain strategy. The source functions in CleanCo and PharmaCo used product category as a way of differentiating purchasing strategies, which directly linked to the Kraljic matrix. ElecCo used a dual sourcing strategy to reduce the risk of their outsource partners becoming a bottleneck or strategic / critical supplier. Theoretically, following through the differentiation of the other core supply chain processes based on the supply chain strategy drivers (SSSD), better alignment with the 'source' process could be achieved if these drivers were considered in addition to conventional purchasing criteria.

CleanCo − unlike the other focal firms − had not recently revisited its supply chain strategy, and was bound by its traditional and fragmented approach to operations. This struck a chord with the author, as there are likely to be a number of UK manufacturers in the same position. It raises the question: At what point does a supply chain require a wholesale re-design rather than incremental improvement?

8.3.1.3 Link between MS & SC Strategy

Two of the three case studies demonstrated a direct link between customer segmentation and supply chain strategy. 4PLElecCo developed a supply chain solution specifically for ElecCo because it was a strategic account. In essence it could be considered as a segment of one. This segmentation was driven by account value and not buying behaviour, and so the 4PLElecCo case did not provide evidence that different behavioural segments drive different supply chain responses. In contrast, PharmaCo demonstrated a direct link between the store segmentation strategy, buying behaviour and supply chain strategy. The relationship between buying behaviour and supply chain strategy was one-to-many, with the pharmacist having the power to select the best supply route to fulfil a customer order depending on the context. Specific supply routes were not limited to specific behavioural segments. The CleanCo case study provided no evidence of a link between market segmentation and supply chain strategy. Such a link would have been difficult, given their account value based approach to segmentation and the absence of a holistic supply chain strategy.

Hypothesis HSC3:

'There is a direct link between customer segmentation and supply chain strategy. Different behavioural segments drive different supply chain strategies'

was not fully supported. The first part of the hypothesis was supported by two of the three case studies, but only one case actually used behavioural segments to drive different supply chain strategies. This hypothesis was developed to test the underpinning logic of the strategic alignment model (Gattorna and Walters, 1996; Gattorna, 1998). This model suggests a one-to-one relationship between customer segments (determined by buying behaviour) and resulting supply chain strategies. Whilst it was not fully supported, the evidence suggests that behavioural segmentation

is just one of the bases that is relevant for customer segmentation. By adopting a more holistic approach to customer segmentation, as the Porter approach provides, if buying behaviour is the most relevant basis this will emerge. The key is to identify the most relevant basis for customer segmentation to match a given context. This can then be used to drive supply chain strategy. As demonstrated by the PharmaCo case, it does not follow that the segments will have a one-to-one relationship to supply chain strategies. It may be one-to-many. The key is that it starts with an understanding of the customer. That understanding should be based on a knowledge of what the customer values, and not on internal perception. The 4PLElecCo supply chain was responsive to the needs of ElecCo and not the needs of the end customers, which may be why 20% of their customers chose to 'opt out'.

8.3.1.4 Underlying Mechanisms

This thesis has identified two different types of underlying mechanisms that have an impact on the development of CRSC strategy: contextual drivers and internal mechanisms (enablers/inhibitors). Seven contextual factors were identified (globalisation, outsourcing, demand fragmentation, market polarisation, relative size, global economic cycles and government regulation) and three mechanisms (organisational design, performance measurement and information systems).

The contextual drivers appear to be generic, but their application is specific to the supply chain context in which they operate. In particular, there appear to be two stances that can be taken to the drivers of globalisation and outsourcing:

- a proactive stance, as taken by 4PLElecCo whereby these drivers shape the supply chain strategy and become an integral part of the business model, or
- a reactive and slightly defensive position, as adopted by CleanCo.

The internal mechanisms evolved from an analysis of the enablers and inhibitors based on an adapted version of Schein's (1992) levels of culture. The mechanisms are the levers by which the underlying assumptions and hence the artefacts in an organisation can be changed. They enable or inhibit the development of CRSC supply chain strategy depending on the way that they are used. It is difficult to prescribe the way the levers should be used as this would be dependent on the supply chain context, but some general attributes begin to emerge. Enabling features of organisational design included: flat management structure, small dedicated teams, high degree of SC expertise, job rotation, boundary spanning roles, clear roles and responsibility, and co-location. From a performance measurement perspective, enablers included: use of the BSC approach across the supply chain, a consistent approach for daily, weekly, monthly and quarterly review, exception management, and use of the performance measurement system to drive performance improvement. Enabling attributes of information systems included: an integrated system, discipline, accurate and timely data, real time systems and the use of Electronic Data Interchange (EDI). Whilst it is not possible to positively identify them as such, the context specific enablers have the potential to be VRIN resources.

8.3.2 Potential for Increased Customer Responsiveness

The potential for improved customer responsiveness by adopting a customer driven approach to the supply chain exists in all three cases. These studies identified a direct link between the degree of alignment (strategic, internal, external and end-to-end) and

the degree of customer responsiveness, which supports the theory underpinning the strategic alignment model (Gattorna and Walters, 1996; Gattorna, 1998). The degree of improvement varies depending on current performance. When the degree of alignment and customer responsiveness are low, the opportunity for improvement is greatest. PharmaCo had demonstrated a high degree of alignment and customer responsiveness – and hence the opportunity for improvement – focused on the inhibiting characteristics of the internal mechanisms. In contrast, CleanCo and PharmaCo, with low and medium degrees of customer responsiveness respectively, required some modification to the existing bases for customer segmentation to improve. Segmenting customers in a way that is meaningful to the supply chain is very context-specific. The approach used by PharmaCo is very different from those proposed for CleanCo and 4PLElecCo. Identifying the right bases for segmentation is therefore a major challenge in the development of CRSC strategy.

The 4PLElecCo also identified an interesting distinction in the supply chain strategy drivers. The evidence from theory (Christopher and Towill, 2002) and the current state, suggested the development of three drivers: product, demand type and lead time. Christopher and Towill suggest two polar extreme options for each of these criteria. For instance for product it would be a choice between standardised and customised. The 4PLElecCo case suggested that there may be more than two product options, which could be positioned across the whole span of the Lampel and Mintzberg (1996) standardisation continuum. This is further evidence of the limitation of a normative approach, and supports the need for the identification of a framework and set of guiding principles to underpin the development of CRSC strategy.

8.3.3 Framework for Developing CRSC Strategy

There are two main elements to this section. The first (presented in section 8.3.3.1) is to review the seven core principles that emerged from the literature review in chapter 2, in light of the empirical evidence from the studies for this thesis. The second (presented in section 8.3.3.2) is to synthesise these guiding principles and other key learnings from the research into a framework for developing CRSC strategy.

8.3.3.1 The Guiding Principles

Of the seven guiding principles synthesised from the literature review in chapter 2, as illustrated in table 8-2, five were fully supported and two were partially supported. The context-specific nature of SCM was apparent from many different aspects. The elegance of the critical realist / design science approach is that it enabled the author to look beneath these superficial differences and begin to understand both the contextual drivers and internal mechanisms that drove the current state. It is therefore essential that CRSC strategy begins with an understanding of the competitive environment. It also means that normative approaches to the development of CRSC are limited as they do not allow the freedom to develop a solution that is truly context-specific. A more appropriate approach, in line with the critical realist / design science epistemology, is to develop the strategy based on a strategic framework and set of guiding principles (van Aken, 2004; Lapide, 2006). Another important aspect of CRSC strategy is that it starts with the customer. The case studies with the highest degree of customer responsiveness both developed their supply chain strategies from the customer back. PharmaCo had

the highest degree of responsiveness and used store format as the basis for segmentation. This was the most relevant means for their context.

Guiding Principle	Empirical Evidence	
	Y/N	Comments
CRSC strategy is 'context-specific' i.e. the external and internal environment of the focal firm is unique and needs to be considered as such	Y	• The case contexts of all three cases were very different
Given its context specificity, CRSC strategy begins with an understanding of the competitive environment	Y	• Seven contextual drivers were identified from the fieldwork. Five were relevant across all three case studies and had a direct bearing on the development of CRSC strategy
CRSC strategy is aligned to the business unit and corporate strategy	Y	• The two case studies that had the highest degree of customer responsive used a BSC approach to align the business unit to a common set of business objectives • The underlying assumptions of these case studies included a business focus
CRSC strategy is developed based on a strategic framework and set of guiding principles and not a set of generic frameworks and prescriptive solutions	Y	• Empirical evidence has shown that normative frameworks do not allow the freedom to develop a customer segmentation or supply chain strategy that is specific to the context in which it operates
It develops from a customer (not a product) centric approach	Y	• The two case studies that had the highest degree of customer responsiveness had both developed their supply chain strategy from the customer back
It begins by segmenting the customers in a way that is relevant to supply chain strategy. OW/OQ can be used to describe the different customer segments	Y & N	• Y – Relevant segmentation was found to be a key element of PharmaCo's success. It was also found to be a key element of the proposals for improving customer responsiveness in the other case studies • N – There was no mention of OW/OQ as a method of describing the needs of the different customer segments
Supply chain strategy is then developed to meet the requirements of individual customer segments. Supply chain strategy drivers could be used to define the key operational variables	Y & N	• Y – PharmaCo developed a range of supply chain strategies to meet the needs of their behavioural segments. • N – The relationship was not one-to-one but one-to-many i.e. one strategy was not developed specifically for one segment • Y – there was evidence to suggest that supply chain strategy drivers could be used to define the key operational variables

(Y = yes, supported, N = no, not supported)

Table 8-2: Empirical evidence to support the seven guiding principles

Identifying the relevant means of segmentation is a crucial step in the development of CRSC strategy. No evidence was found of OW/OQ being used to describe the needs of the segments once they had been identified. This does not mean that it is not relevant, just that it was not found during the author's research. PharmaCo also used their behavioural segments as a basis for developing their supply chain strategy. However, the relationship between the segments and supply chain strategies was not one-to-one. Supply chain strategy was not developed to meet the needs of individual segments. There was evidence that supply chain strategy drivers could be used to define the key operational variables. Three were explicitly identified from the case analysis (product, demand type and lead-time). On reflection, the author would also add volume and variety (the key dimensions on the Slack et al. (1998) product: process choice matrix), and delivery reliability to this list. These strategy drivers should be considered as continuums of options between two extreme positions (e.g. a continuum from pure customisation to pure standardisation with a range of options in between). This contrasts with the more common approach of only offering the extreme positions as two alternatives. Finally, it is important to have alignment between the business unit and corporate strategy. PharmaCo and ElecCo used the BSC to ensure alignment of their SC strategy with the broader business objectives. These companies also had 'business focus' as one of their underlying assumptions.

8.3.3.2 The Emerging Framework

The 'emerging framework' is a pictorial representation of the key findings from these studies and is illustrated in figure 8-4. It represents a synthesis of both the theoretical and empirical findings.

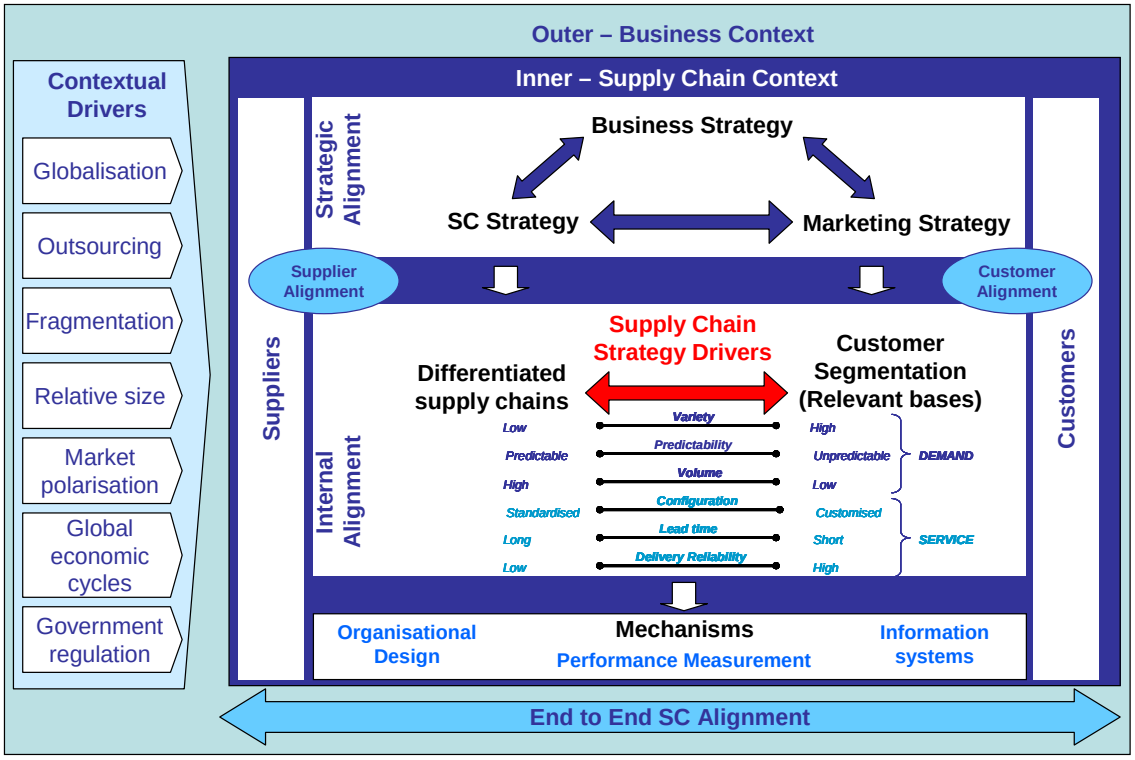


Figure 8-4: Framework for developing CRSC strategy

On the outside the framework depicts the outer-business context, an understanding of which is so crucial to developing a strategy that is context-specific. Within this sit the seven generic contextual factors. This list is not exhaustive, but should serve as a starting point. All of these factors may not be relevant in every context and the way in which they impact on the internal-supply chain context may also vary. The inner-supply chain context is embedded within the outer-business context. Reflecting the unit of analysis for this thesis, the internal context considers the conversion of demand into supply and includes customers and suppliers as well as the focal firm. This model could be customised to reflect the scope of the particular supply chain to which it was being applied, and more echelons may be shown. The model also depicts the four types of alignment that are linked to the effective development of CRSC strategy: strategic, internal, external (customer and supplier) and end to end supply chain alignment. Strategic alignment is the alignment of business strategy (corporate and business unit) with marketing and supply chain strategy. Internal alignment refers both to the alignment between marketing and supply chain strategy and also the alignment within the supply chain strategy between the core supply chain process (plan, source, make and deliver). This is enabled at a process level by finding the most appropriate means for customer segmentation that can be translated through the supply chain strategy drivers into a differentiated supply chain strategy. The supply chain strategy drivers (SDSDs) have been divided into two groups: demand and service. Demand SCSDs include continuums of: volume (low to high), predictability (predictable to unpredictable) and

variety (low to high). Supply SCSDs include continuums of: configuration (customised to standardisation), lead time (long to short) and delivery reliability (low to high). If the SCSDs were applied to a real supply chain, the generic scales could be made more specific and even quantified. External alignment is the alignment of the internal operation with its external stakeholders – most notably, but not exclusively, customers and suppliers. End-to-end supply chain alignment – as its name suggests – refers to the alignment of the whole supply chain. From the perspective of the focal firm, all four types of alignment are enabled or inhibited by the way in which the three internal mechanisms are used. This in turn has an impact on the degree of customer responsiveness achieved by the end to end supply chain.

8.4 Contribution of the Research

The contribution of this research to both theory (section 8.4.1) and practice (section 8.4.2) will now be discussed.

8.4.1 Contribution to theory

These studies have contributed both to the development and testing of theory relating to the development of CRSC strategy. The literature review in chapter 2 provided a synthesis of the underpinning bodies of literature that has not previously been conducted in this way. This resulted in the identification of seven core principles for the development of CRSC that created the foundation for the author's empirical investigations. The literature review also identified that previous studies have been largely theoretical, and many have tested their frameworks by remotely applying them to public domain case studies. Those empirical studies that do exist have tended to focus on one particular dyadic relationship within the supply chain, and have failed to embrace the full scope of the supply chain as depicted by SCOR® – from customers' customer to suppliers' supplier. This scope was too broad for a single doctoral study, and whilst the author sought to look beyond the dyad she limited the scope from the first customer to first supplier of the focal firm. A contribution has therefore been made to testing the theory of CRSC strategy both from a process and output perspective. From a process perspective, a contribution has been made to methodology by developing a robust approach for conducting supply chain research beyond the dyad. In terms of output, the author has the empirical results from the three individual case studies and their cross-case comparison for dissemination to an academic audience. Completing the loop, the author has further contributed to the development of theory by synthesising the output from the literature review with the output from the empirical research to develop a framework for developing CRSC strategy. Specific contributions of this framework to theory development include:

- The synthesis of the seven core principle for developing CRSC strategy from the existing body of literature enriched through empirical testing
- Empirical derivation of the seven contextual drivers
- Derivation of the concept of supply chain strategy drivers as a mechanism for translating the needs of the customer segments into supply chain strategy. These differ to OW/OQ. As illustrated in figure 2-17. OW/OQ are most effectively used as means of describing customer requirements (i.e. bases for segmentation) with customers being grouped based on common criteria. Supply chain strategy drivers are then used to help develop the relevant supply chain strategy.

- Identification of the four types of their alignment and the emerging link between the degree of alignment and degree of customer responsiveness
- Empirical derivation of the three underlying mechanism (organisational design, performance measurement and information systems). Depending on their application they have an enabling or inhibiting effect on the development of CRSC strategy. When used in an enabling way these mechanisms have the potential to be VRIN resources.

Finally, as listed in table 3-13, the author has published a number of conference and journal papers disseminating the results of her research. This has primarily focused on the results of the empirical studies.

8.4.2 Contribution to practice

The author has a strong desire to ensure that good research is turned into good practice, and has therefore actively sought opportunities to disseminate the output of her research to practitioners. This also aligned with the objectives of the EPSRC and IMRC who funded the DeCoRs project which has underpinned the studies for this thesis. In conjunction with her supervisor, the author developed a 3-day executive development open programme based on the emerging output from her studies. This programme ran for over two years and was attended by 20 different companies. Additionally, she also sought opportunities to present the output of her research to other interested parties. On request the author has made presentations to Philips Consumer Electronics, BP and logistics / supply chain directors from 15 different companies at a supply chain forum meeting hosted by Vlerick Leuven Gent Management School.

A key output of the research has been the development of a deep and lasting relationship with BAT. The author has worked closely with BAT over the last 4 years and has used the output from her thesis to act as a framework for supply chain strategy development workshops. These workshops were used to inform the strategy re-design processes of BAT UK&I, BAT Russia and more recently the BAT Global supply chain. This in turn has led to requests from other global multi-national organisations for the author to fulfil a similar role.

The author has also been asked to contribute chapters based on her thesis to two books in the field of supply chain strategy. One is specific to food supply chains and the other is an edited book on dynamic alignment being compiled by John Gattorna. To be asked to contribute to a book by someone so eminent in the field is a true honour.

8.5 Research Limitations

Whilst every step that was practical to ensure the rigour and reliability of these studies has been taken, in a field as complex supply chain management there are inevitably some limitations. Four minor limitations have been identified:

1. Due to limited size of the case study approach, the results can only be generalised to theory and not to practice. As discussed in section 8.6 alternative research methods would need to be employed to improve the generalisability of results to practice e.g. large sample survey.

2. The scope of the study was from first customer to first supplier of the focal firm. This made the studies large and complex. In analysing the results, the information collected from suppliers and customers was used to triangulate the views of the informants from the focal firm, and was not a major part of the analysis.

3. Whilst the scope of data collected for the three cases was the same, the quality of information varied. As demonstrated in chapter 7, good quality cross-case analysis was still possible but the relative strengths of the three cases varied. The CleanCo case provided particularly rich information regarding the underlying mechanisms. The 4PLElecCo case, exemplar material on the use of performance measurement systems and the PharmaCo was the best example of CRSC strategy in practice.

4. The focal firms and their clients restricted access to certain parts of the supply chain. In particular, ElecCo would not permit us to interview their tier 1 customers, and PharmaCo denied access to their pharmaceutical suppliers.

8.6 New Areas for Research

As one door closes another one opens. Whilst these studies may be drawing to a close, they have identified the opportunities for further research in at least six different areas.

1. A large sample survey to identify the most common bases of customer segmentation used within European supply chains. This would provide further empirical evidence to further test HSC1, and a new hypothesis that over 60% of companies segment their customers based on account value.

2. Empirical testing and development of the Porter (1985) approach to industry segmentation. This approach was identified as the best starting point for companies wishing to embark on customer segmentation to inform supply chain strategy. With over 26 potential bases for segmentation it is a bit unwieldy. How useful is this approach in practice and can it be simplified?

3. Empirical research to test the usefulness of the supply chain strategy driver concept. This would include both a review of the approach and the drivers themselves.

4. Empirical research to test the enabling / inhibiting effect of the internal mechanisms on the development of CRSC strategy. This would also include both a review of the approach and the mechanisms themselves.

5. Empirical research into the evolution of CRSC strategy over time. Access permitting, it would be beneficial to revisit the three case studies to understand how their supply chain strategy has developed over the intervening period and why?

6. Empirical exploration of the concept of enablers as VRIN resources.

With an area of study as broad and complex as this, the opportunities for further research are almost infinite. These were the emerging ideas that the author believes could be the most valuable.

8.7 A Final Word…

Since joining academia in January 2001 the author has been involved in the development of CRSC strategy. This has been a long and at times tortuous road. Since 1960, Theodore Levitt has been urging companies to think from the customer back. Despite the simplicity of the theory, practice has been riddled with complexity. In the last year or so, the author has sensed a change in attitude. Supply chain strategy is now big news, both in terms of success and failure. It has finally permeated the board agenda, and senior executives are beginning to realise that supply chain strategy linked to marketing strategy is effectively their business strategy. The ground is therefore very fertile for further research in this area.

Acronyms used in this thesis

ASCRC	Agile Supply Chain Research Club
B2B	Business to business
B2C	Business to consumer
BI	Business integration
BSC	Balanced score card
CC	Customisation centre
CCIL	CleanCo International
CG	Component goods
COE	Chain of evidence
CRSC	Customer responsive supply chain
CS	Current state
DC	Demand creation
DCDF	Demand creation: demand fulfilment
DCM	Demand chain management
DF	Demand fulfilment
DGO	Day go rate
DMU	Decision making unit
DOL	Division of labour
EAD	ElecCo Authorised Distributors
ECR	Efficient customer response
EDL	Every day low price
EDP	ElecCo Distribution Partners
ELC	European logistics centre
EMEA	Europe, Middle East and Africa
EPOS	Electronic point of sales
EPSRC	Engineering and Physical Sciences Research Council
ERP	Enterprise resource planning
FG	Finished goods
FP	Future potential
HR	resources
ICT	Information & Communications Technology
IO	Industrial Organisation
IJOL	International Journal of Logistics
IJOPM	International Journal of Operations and Production Management
ISL	International Symposium of Logistics
IT	Information technology
JIT	Just in Time
KAM	Key Account Management
KPI	Key performance indicator
LRN	Logistics Research Network
MBW	Moisturising body wash
MIT	Merge-in-transit
MOI	Marketing-Operations Interface
MOQ	Minimum order quantity
MQ	Market qualifiers

MRP	Material requirements planning
MTS	Make to stock
MW	Market winners
OB	Organisational behaviour
OED	Oxford English Dictionary
OEE	Overall equipment efficiency
OQ	Order qualifiers
OTD	On time delivery
OU	Open University
OW	Order winners
PI	Principal Investigator
PLC	Product life cycle
POD	Proof of delivery
PPM	Predominant process model
PUDO	Pick up and drop off
QA	Quality assurance
QR	Quick response
R&D	Research and development
RBV	Resource-based view
RDC	Regional distribution centre
ROI	Return on investment
ROS	Return on sales
SA	Strategic alignment
SC	Supply chain
SCM	Supply chain management
SCOR©	Supply Chain Operations Reference model
SKU	Stock keeping unit
SLC	Strategic logistics centre
SM	Scientific management
SP	Service provider
SPL	Service parts logistics
SWOT	Strengths, weaknesses, opportunities and threats
TPS	Toyota Production System
VFM	Value for money
WBS	Work breakdown structure

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APPENDICES

Appendix 1: Semi-structured Interview Schedule

Semi-structured Interview Schedule

Structure & Content

Section	Topic	Phase	Interviewees
1	Environment • *Internal* • *External*	Scoping study	Senior management with a business & SC overview
2	Supply Chain Overview • *Plan* • *Source* • *Make* • *Deliver*	Scoping study – but only at a top level to enable navigation around the SC & a research focus to be identified for the main study. This will be validated in more detail in the research content phase	Senior management with a business & SC overview
		Main study (focal firm)	Heads of key SC processes (Plan, Source, Make, Deliver)
		Main study (customers & suppliers) but only for relevant processes as identified during fieldwork.	Key interfaces with focal firm identified through fieldwork
3	Supply Chain Relationships • *Internal* • *Customer* • *Supplier*	Main study	Heads of key SC processes (Plan, Source, Make, Deliver) and key interfaces (e.g. NPI and customer service)
		Main study (customers & suppliers) but only for relevant relationships as identified during fieldwork.	Key interfaces with focal firm identified through fieldwork
4	Process management • *Product & process development* • *Information management*	Main study	Heads of key SC processes (Plan, Source, Make, Deliver) and key interfaces (e.g. NPI and customer service)
		Main study (customers & suppliers) - their perspective on focal firm	Key interfaces with focal firm identified through fieldwork
5	Customer Responsiveness	Scoping study	Senior management with a business & SC overview
		Main study	Heads of key SC processes (Plan, Source, Make, Deliver) and key interfaces (e.g. NPI and customer service)
		Main study (customers & suppliers) - their perspective on focal firm	Key interfaces with focal firm identified through fieldwork

Interview Questions

Section 1: Environment

Internal Environment

1. How would you describe your company's mission and strategic objectives?
2. What are the main businesses in which the company operates?
3. How is the company organised? (An organisation structure would be useful)
4. What is the company history?
5. How is the company financed? (e.g. private, listed, public etc.)
6. How many employees does the company have?
7. Is the company part of a larger group?

For each business (or for a particular focus):

8. What are the mission and strategic objectives?
9. What % of total turnover?
10. Of what strategic importance is each business? (Are they growing, declining, future star?)
11. Who are the key customers?
12. Who are the main competitors?
13. What are the key products?
14. What do you think gives you your competitive edge?

External Environment

15. What are the key markets in which the businesses operate?

For each marketplace (or for a particular focus):

16. How would you describe the market place at the moment?
17. Who are the key players?
18. What % market share (by volume and value) do they currently have?
19. How do you see this changing over the next 5 years?
20. What are the barriers to entry?
21. What are the threats of other products or substitutes entering the market?
22. How many customers do you have?
23. Are there any dominant customers?
24. What bargaining power does the customer base have?
25. What are the key products in each market?
26. How many suppliers do you have?
27. Are there any dominant suppliers?
28. What bargaining power does the supply base have?
29. What are the key products in each market?

Section 2: Supply Chain Overview

The purpose of the supply chain overview is three-fold:

- To understand the supply chain infrastructure, from supply through to delivery to customer, utilised by the focal case study partner (i.e. a summary of all possible routes)
- To understand the scope of each of the key elements in the SCOR model
- The top level KPIs used by the company/business

Plan

30. Does the company have a forecasting process? If so, who is involved and what is their level of involvement?
31. How frequently is the forecast updated?
32. What planning processes does the company employ (try and tease out differences in the short, medium and long term)?
33. Are there any differences in the process? (e.g. between customers, products or businesses)
34. How does this process deal with new products?
35. How does this process deal with new customers?
36. How does the forecasting process interface with the planning process?
37. What measures does the company use within the forecasting/planning process?
38. What are the main issues in the planning process?

Source

39. How many suppliers does the company have?
40. What are the main products that they supply?
41. Are there any differences in the way in which different materials are procured?
42. Does the company have any specific supply initiatives e.g. VMI, CMI, CR etc.
43. What is the buying structure? (How is the supply base considered e.g. by commodity, by replenishment type, by relationship type, sub-contracted?)
44. What is the longest, shortest and average lead-time item?
45. What is the targeted level of inventory for raw materials? Does it vary by product? Does it vary throughout the year?
46. Does the company measure supplier performance? If so how?
47. Do suppliers measure the company's performance? If so how?
48. What are the main issues related to sourcing?

Make

49. How many manufacturing plants/assembly plants does the company have?
50. Who owns/operates the facilities?
51. What products flow through each of these sites?
52. What are the key processes involved at each of these sites?
53. What types of process do the plants employ? (Job shop, continuous flow etc.)
54. What is the primary manufacturing focus: efficiency or flexibility? (Or something else)
55. Does the company have any specific manufacturing capabilities?
56. What is the average throughput time? What are the longest and shortest throughputs times?
57. Is there any WIP? If so, what is the average WIP level? What are the highest and lowest WIP levels?
58. What measures does the company use within the manufacturing process?
59. What are the main issues relating to manufacturing/assembly?

Deliver

60. How does product get from the manufacturing/assembly facility to market?
61. What warehousing facilities does the company have?
62. Who owns/operates these facilities?
63. What transportation methods does the company operate?
64. Who owns the fleet, and manages the process?
65. What routes to market does the company employ?
66. What % of customers use each route? How does this vary? (e.g. by product, by customer)
67. Does the company offer any specialised services to the customer? (e.g. VMI) If so with whom?
68. Does the company measure its performance to customers? If so how?
69. Do customers measure the company's performance? If so how?
70. What are the main issues relating to warehousing and distribution?

General

71. What changes/ developments are envisaged in the future, why?
72. What is likely to enable or inhibit them?
73. What are the main supply chain issues?

Section 3: Supply Chain Relationships

Internal Company Operations (All SCOR activities)

Focussing on the activities carried out by your company,

74. How are these activities arranged? (Prompt: are all similar activities carried out at one site or in one department, or are they split by product, category or customer?)
75. Why is it done this way?
76. What management structures are in place to support and control these activities?
77. What are the benefits/ drawbacks of this approach?
78. What KPI's do you use as a company?

Supplier/ Subcontractor Relationships (Source)

79. What raw materials or components do you purchase as a company?
80. How do you choose your suppliers?
81. What purchasing arrangements do you have in place? (e.g. ordering from supplier stock, consignment stock, vendor managed inventory)
82. Are there different practices for different component categories (e.g. runner, repeater, stranger), different suppliers, different products and/or categories, and if so why?
83. What management interaction is there between your company and your suppliers? (e.g. only purchasing/ sales contact or multiple contacts by function or seniority) Again, does this vary for different suppliers, products and/or categories and if so why?
84. What makes for a successful supplier relationship?
85. How do you measure your suppliers?
86. How do your suppliers measure you?

Customer Relationships (Deliver)

87. Who are your major customers and what do you supply them?
88. Why do you think they choose your company?
89. What supply arrangements do you have in place? (e.g make to order, make to stock, vendor managed inventory, CPFR etc.)
90. Are there different practices for different products and/or categories/ customers, and if so why?
91. What management interaction is there between your company and your suppliers? Does this vary for different customers/ products and/ or categories and if so why?
92. What makes for a successful customer relationship?
93. How do your customers measure you?
94. How do you measure your customers?

Section 4: Process Management

Product & Process Development

When answering questions in this section, it may be useful to relate the question to a specific example.

95. What impact, if any, does the introduction of a new product or the development of an existing one have on your company's supply chain activities? The extended supply chain?
96. How are such introductions, developments managed? Who is involved and why?
97. What are the benefits/ drawbacks of this approach?

98. How is process improvement managed across the supply chain? Who is involved (Prompt: internal personnel, customers, suppliers, consultants?)
99. What do you find enables or inhibits such initiatives?

Information Management & KPI's

100. What information is shared across the supply chain? Why?
101. What are the benefits/ drawbacks of this approach?
102. How has this changed practices, roles and responsibilities along the supply chain? (Prompt: shifting responsibilities between companies, greater understanding of customer's requirements, improved supplier responsiveness? etc.)

Section 5: Customer Responsiveness

Customer Responsiveness

103. To what extent do you seek to be responsive to the customer?
104. How does this influence what you do/ how the supply chain is managed? (give examples if possible)
105. What barriers/ enablers do you find to achieving responsiveness?
106. How do you try to overcome these barriers/ capitalise on these enablers?

Appendix 2: Example of Project Document – 4PLElecCo

This includes:

- **Work breakdown structure (WBS)**

In co-operation with

4PLElecCo

Project:

Developing the Capabilities for Customer Responsive Supply Chains

No	Change description	Justification	Date
0	New issue	New issue	November 12, 2001
0.1	Addition of key project milestones Clarification of information requirements Clarification of collaborating universities	Amendments following conference call discussion	December 12, 2001
0.2	Clarification of pre-work activities WBS (Section 5); reflection of method changes discussed (Section 4); clarification of attributed information sign off (Section 10)	Amendments following conference call discussion	January 18, 2002
0.3	Updated project plan, addition of WBS and refocusing of objectives as a result of the Proposal meeting	Amendments preceding Project Proposal Sign Off	May 7th 2002
1.0	Project Proposal document, inclusion of confidentiality agreement milestone and quantitative analysis deliverable	For Sign off	May 8, 2002
1.1	Additions to Research Content WBS Format changes: Table of contents/ List of appendices List of Acronyms Move WBS to appendices, along with combined resources & organisation section	Sign off amendments from CH	May 17, 2002

	Cranfield	OUBS	4PLElecCo	ElecCo
Signature				
Date				
Name	A Harrison J Godsell	J Storey CA Emberson	FH	EdB

1. Scope

A case-based exploration of cross-boundary, customer-responsive supply chain practices from both a technical and behavioural perspective. The core supply chain management practices of plan, source, make and deliver will be investigated, supported by product/service & process change practices and information management routines. These components are illustrated diagrammatically in Figure 1.

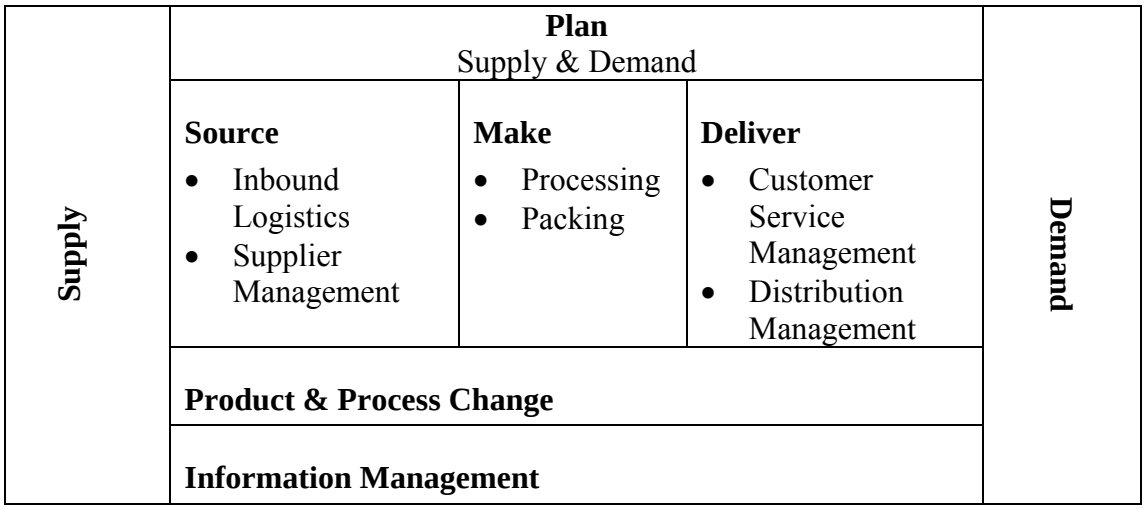

Figure 1: Supply Chain Elements

2. Objective

In its broader context, this exploration into Customer responsiveness seeks to address the following questions:

- What is 'customer responsiveness' in the context of supply chain management?
- What are the key capabilities required both within an organisation and across a supply chain/network to be 'customer responsive'? Which capabilities are generic and which are industry, category or product specific?
- How can these capabilities be measured?
- What are the 'enablers' and 'inhibitors' of 'customer responsiveness' in supply chain management? Which are generic and which are industry, category or product specific?
- How can this knowledge be used to construct a 'roadmap' for the design and implementation of 'customer responsive' practices & processes?

Within the context of 4PLElecCo supply chain, the following specific objectives were agreed:

- To understand what drives customers to 'opt in' or 'opt out' of the 4PLElecCo logistics service
- If Opt in, to understand what elements of the service are valued
- To understand the fit between what the customer wants and current service offerings of 4PLElecCo

3. Benefits

- Exploration of multiple customer perceptions of current responsiveness levels against expectation
- Understanding of the dimensions considered central to customers' decision-making regarding 'opt in' or 'opt out' logistics routes; to provide the basis for further quantitative customer satisfaction assessment [Outside the scope of this project]
- Opportunities for cross-sectoral learning within the wider EPSRC-funded project

4. Methods

The study will utilise a 'paired' research design to collect both common and distinctive data on two 'service' situations. (e.g. contrasting customers, contrasting product offerings and/or contrasting fulfilment processes.)

Information will be gathered primarily through a combination of process mapping and semi-structured interviews carried out either face-to-face or over the telephone and may utilise existing data collections e.g. customer and operational databases. Information will be gathered for both technical mapping and semi-structured interviews both within and between organisations to ensure validity.

Customer needs and expectations will be investigated using both qualitative and quantitative data. Specific analysis of existing quantitative data sets will be used to inform the qualitative research. Deriving from this qualitative research, it is expected that the dimensions currently used within the quantitative customer satisfaction survey could be reassessed.

5. Project Plan

This project is envisaged to start in May 2002, subject to constraints such as peak trading periods/ holidays, and run for between 5 - 6 months.

Activity\ Month	Pre-work	1		2		3		4		5		6	
Agree Proposal													
Data Collection: 4PLElectronicsCo													
Data Collection: 4PLCustomers													
Data Collection: Supplier/Subcontractors													
Date Collection: Receiver Sample													
Consolidation/ Model Development													
Project Reviews													

The plan assumes process-mapping activity will commence at 4PLElecCo, to provide a sound understanding of current practices before approaching either customers or suppliers. It is also envisaged that this will be divided into two phases – research context to gain as broad a view as possible of the organisation and situational context, with the second, research content, to gain more detailed insight into specifics arising from investigation in other parts of the network.

Plan structure is subject to modification, depending on the output from the research context exercise and ongoing research activity

Key Project Milestones:

Milestone	Event	Indicative Date (End)	Suggested Involvement
0	Proposal Sign off	February	EdB/FH/JG/CE (conference call /meeting)
1	Situational Research Methodology Sign Off	May	EdB/FH/JG/CE (conference call /meeting)
2	Confidentiality Agreement Sign Off	May	JS/ AH/ JG/ CE
3	Interim Project Review Phase1	July	JG/CE/FH/EdB/AH/JS (meeting)
4	Final Project Review	October	JG/CE/FH/EdB/AH/JS (meeting)

For detailed work breakdown schedule (WBS) relating to the research context and research content phases, please see appendices.

6. Risk assessment

Issue	**Actions**
Case study generalisability	Explicit, targeted customer sampling to establish dimensions for further quantitative research (out of project scope)
Partner expectations (4PLElecCo, ElecCo, Universities)	Joint development and up-front agreement of project methodology and anticipated outcomes. Periodic Review
Meet wider project requirements of EPSRC funding	Research access to cross at least 4 'boundaries' (internal/external)

7. Deliverables

- Research context report

- Research content report – including dimensions for basis of further survey work and quantitative support of qualitative data analysis in terms of specific customer/ product scenarios based on existing data
- Case study research material for cross-case comparison

8. Review Mechanisms

- First phase and end of project review between industrial and academic partners
- The wider academic research project is subject to quarterly review with Professors Alan Harrison and John Storey

9. Information

- Information will be gathered in various forms: transcripts of semi-structured interviews, survey results, process maps and quantitative data (e.g. throughput times, stock levels, number of components etc) relating to company, category and product activities for planned use in unattributed, sector-generalised form within academic reports and journals
- In the case of information for publication this is presented as Company specific
- See confidentiality agreements in appendices

10. Communication

- Communication from project manager to and from project sponsor and project team to be decided
- Decision to be made how often (milestones only) and what means of communication to be used (con call?)

11. Budget

- Cranfield to sponsor own resource and travel expenses
- OUBS to sponsor own resource and travel expenses
- 4PLElctronicsCo to sponsor own resource and travel expenses

Appendices

Appendix 1: Confidentiality Agreements

Signed hard copies to be circulated, 29/05/02

Appendix 2: List of Acronyms

EPSRC	Engineering and Physical Science Research Council
SC	Supply Chain
NPI	New Product Introduction
KPI	Key Perfromance Indicator
SCOR	Supply Chain Operations Reference model
VMI	Vendor Managed Inventory
CMI	Co-Managed Inventory
CR	Continuous Replenishment
WIP	Work In Progress
CPFR	Collaborative Planning Forecasting & Replenishment
WBS	Work Breakdown Structure
LLP	Lead Logistic Provider

Note: This list had client-specific acronyms removed to protect confidentiality.

Appendix 3: Work Breakdown Schedule

Prework

Task	Elements	Resource	Duration
Orientation Visit Preparation	• Arrange appropriate access and representation	FH	TBD
4PLElecCo orientation	• Overview of 4PLElecCo operations • Overview of 4PLElecCo/ElecCo customer interface and personnel • Focus on current Customer Satisfaction-related processes & practices • Related data definition/ collection	JG/ CE + 4PLElecCo	1 day (Day 1) As required
ElecCo	• Confirmation of Customer (as Payer) project requirements • Overview of ElecCo / 4PLElecCo interface • Focus on existing customer satisfaction survey methods, processes and related practices • Related data definition/collection	JG/CE + ElecCo	1 day (Day 2) As required

Research Context

Task	Resource	Schedule	Complete
Define External Context	FH	8 May	8 May
Define Internal Context	FH	8 May	8 May
Supply Chain Overview	CH	8 May	8 May
Supply Chain Relationships Overview	CH	8 May	8 May
Define Project Focus	EdB/FH	8 May	8 May
Schedule Research Content Activities	JG/CE	8 May	8 May
Draw up confidentiality agreement	FH/EdB	End May	17 May
Select Customers (2 Opt in, 2 Opt out)	EbB	End May	
Schedule visits to carriers	CE/JG via CH	Mid May	
Schedule visits to customers	CE/ JG via EdB/ CH	End May	

Research Content

4PLElecCo			
Planning	Demand Planning Supply Planning	Operations Manager	2 days 29/05/02 and 30/05/02 CE/ JG
Source	Supplier Management Inbound Logistics	Transport Manager	
Make	Processing Packing	Operations Manager	
Deliver	Customer Service Distribution Management	CH TB Transport Manager, KG	
Product & Process Change		FH	
Information / Account management		Account Manager	

Outbound1Co			
Supply Chain & Relationship Overview	Plan, Source, Make, Deliver	Strategic Account Manager	1 day 11/06/02 JG

Outbound2Co			
Supply Chain & Relationship Overview	Plan, Source, Make, Deliver	Overview Buyer, Seller	1 day 25/06/02 CE

Outbound3Co			
Supply Chain & Relationship Overview	Plan, Source, Make, Deliver	Overview Buyer, Seller	1 day 26/06/02 CE

InboundCo			
Supply Chain & Relationship Overview	Plan, Source, Make, Deliver	Overview Buyer, Seller	1 day 18/06/02 CE/JG

ElecCo			
Supply Chain & Relationship Overview	Sales Order Processing Customer Queries	Customer Service Vertical Account Managers, Channel Managers	1 day proposed date 19/06/02 CE/ JG
	Operations Management	Operations Manager EMEALogistics EdB	
	Customer Satisfaction Survey	BH Logistics Programme Manager	
ElecCo Customers (x 4)			
OPT in, Service Provider (TBC)	Customer Requirements Plan, Source, Make, Deliver	Buying, Logistics, etc.	1 day
OPT out, Service Provider, (TBC)	Customer Requirements Plan, Source, Make, Deliver	Buying, Logistics, etc.	1 day
OPT in, S/M distributor (TBC)	Customer Requirements Plan, Source, Make, Deliver	Buying, Logistics, etc.	1 day
OPT out, S/M distributor (TBC)	Customer Requirements Plan, Source, Make, Deliver	Buying, Logistics, etc.	1 day

Appendix 4: Organisation and Resources

Company	Name	Function in project	Cell phone	Phone	Fax	E-mail
4PLElecCo	FH	Sponsor	Sensitive data has been removed for data protection and confidentiality purposes.			
	CH	Project Manager				
ElecCo	EdB	Customer sponsor				
Cranfield School of Management	Professor Alan Harrison	Co-sponsor		+44 1234 754121 Sec. Trisha Pritchard	+44 1234 751712	a.harrison@cranfield.ac.uk
	Paul Chapman	EPSRC Project Manager		+44 1234 751122	+44 1234 751712	Paul.chapman@cranfield.ac.uk
	Janet Godsell	Research Fellow	07796 444232	+44 1234 751122 ext 2914	+44 1234 751712	Janet.godsell@cranfiel.ac.uk
OUBS OUBS	Professor John Storey	Co-sponsor		+44 1908 654733 Sec. Karen Maccafferty	+44 1908 655989	j.storey@open.ac.uk
	Caroline Emberson	Research Fellow	0788 4216941	+44 1908 655989	+44 1908 655989	c.a.emberson@open.ac.uk

4PLElecCo

- Access to representative managerial and operational personnel for the purposes of data collection

- Project sponsor, to oversee project's direction and ensure appropriate access and coverage
- Resource to support data collection activities
- CH to act as overall Project Manager, since 4PLElecCo are LLP. Responsible for organising updates and milestones

ElecCo

- Access to representative managerial and operational personnel for the purposes of data collection related to 'the Customer as payer' as detailed in the work breakdown section
- Project sponsor, to ensure appropriate access and coverage

Other Contacts

- Four selected customers :
    - 2 'opt in'; one service provider LOB, one small/ medium LOB
    - 2 'opt out'; one servicer provider LOB, one small/medium LOB
- Appropriate subcontractor/ manufacturers of 4PLElecCo as detailed in the work breakdown schedule

Academic Partners

- Data collection and analysis will be carried out by 2 research fellows: Janet Godsell (leading the technical aspects) and Caroline Emberson (leading the behavioural aspects) from Cranfield and the OUBS respectively

Appendix 3: Evidence of High Degree of Accuracy between the Interview Summary in Contact Note Format and Recorded Interview

The purpose of this appendix is to show the accuracy and efficiency of contact notes as a way of capturing information from semi-structured interviews. Contact notes were made within 24 hours based on the field notes taken during the interview. They introduced a level of structure to aid analysis and tried to capture the most relevant information in a digestible and easy to use format. The first eight full interviews in the pilot study were fully transcribed and the transcripts compared to the contact notes. This was to check for accuracy and the ability to capture of the most relevant information.

The example used is from interview 4, transcript T#04 and contact notes N#04. It shows how the information recorded in the contact notes refers to information in the transcript. It uses a colour coding system to do this and does so using five different colours to make the link between five different pieces of information between the contact notes and transcript.

CleanCo
FIELDWORK - CONTACT NOTES

Interviewee	GCHh	No.	N#04
Job Title	Senior Purchasing Executive	Date	03/07/2001
Contact Details	With held for reasons of confidentiality	Location	CleanCo House Meeting Room 7

Background

- Previously worked for SSL International (Seton Sharl & London International – Durex) – senior buyer role, 6-7 years
- Had been a buyer before for SSL and other companies
- Focus on FMCG – synergies with CleanCo
- Recently finished an MBA in supply chain management from Leicester
- Been with CleanCo for 3 months

Procurement Team

- 8 in team from senior buyer to buyer and admin (see organisation chart)
- Primary focus on direct materials & 3rd party supply, involved in some non-directs e.g. IT equipment and utilities
- Trying to claw back some of the other areas. Currently have a more traditional manufacturing approach.
- 3rd party supply – can be at total level because don't have technology (e.g. foam burst), some is to meet capacity constraints (e.g. send a kit and they assemble the whole product i.e. provide a filling service)
- Department split into 2 main sections: packaging & raw materials with 2 section heads and specialist buyers
- Day to day stuff, done at factory (expediting or site purchasing) – finite stuff, this is dealt with by the planning department
- More strategic side, contracts etc is dealt with at head office. Obviously dip into day to day as required.
- 'Supplier who can stick to all the rules is better than one who ignores the ones that they think are trivial'
- A lot of the purchasing team have been with CleanCo a while and have a 'that's the way we've always done it' attitude
- 'A fear of failure' – whilst fear not seen to be a consequence of failure in a negative way. Only heard about things in the past 10-15 years. Is this a lag behind the new MD and deputy MD? If it's comfortable then easier to hang onto it than change.

CLEANCO INTERVIEW: GCHh 3 7 2001
SENIOR PURCHASING EXECUTIVE

Excerpt: Pages 1 - 3

GCH: .. definite with the new girl. As I mentioned earlier I came from SSL international. My background has always been procurement and supply, I was in the last company in a senior buyer role for 6 or 7 years and previously to that I had been a buyer in that same organisation and previous organisations, but I'm also concerned with FNCD.ACRONYM?

CSOM: SSL and who you were working for, is that a similar supplier base, or is it a completely different ..

GCH: No, there are certain similarities. It's packaging and raw ingredients, and primarily, or primary focus was the grocery trade so there are synergies. And I don't know whether it's important or not, but last year I completed an MBA in supply chain management, which is why I came to be here because I finished that and thought I wanted to do something different and utilise some of those learnings.

CSOM: Where did you study?

GCH: Leicester.

CSOM: I have a friend who went to Leicester. Did you enjoy it, was it a good course?

GCH: Yes, ish. Enjoyed it when it was over! It's hard work isn't it. You know it is but you don't really appreciate just how much, part-time and weekend workshops and summer schools and things like that. You're just giving your life for 3 years really aren't you, but worth it in the end I think, I hope, but early days yet. I suppose I should start by giving the background of the procurement function as it is within CleanCo at the moment which I obviously inherited. There's 8 of us in total, ranging from senior buyer type roles to buyers and our domain, quite a traditional department in terms of its functionality.

CSOM: Yes, because procurement can mean lots of different things different people and what sort of scope within customers.

GCH: The primary scope iS for direct material purchasing so things that end up in the finished product. There are some ancillary areas that we're getting involved in such as non-directs, energy, IT equipment, mobile phones, grabbing hold of non-directs, but I think traditionally in manufacturing environments the focus has always been on direct materials and somebody else manages all the other area of spend as part of another role. Some marketers will buy their promotional materials as part of a marketing manager's role or whatever and we're trying to claw some of that back, not to say that we want to stop that but we want to have more of a team approach of procurement in the area of specialism that they can bring to it are considered a part of the team, totally with the remit of reducing the total cost. But at the moment that's where our main focus is on direct materials and of course 3rd party supply as well which becomes increasingly

important. We have to manage the 3rd party supply base, ie contract manufacturers as we would, or perhaps more carefully than we would, for any other raw material or packaging or whatever.

CSOM: What do you get 3rd party supplied?

GCH: It can be total product for technology that we haven't got and I suppose foam burst would be the best example there. Obviously we do make aerosols at our Nottingham plant but some of it remains at a 3rd party because it's more convenient, it fits into the strategy to do that means that we've got back up resource and it means that we can take advantage of the suppliers investment in technology and so on. And then some is quite simply that the other end of the scale would be if we have capacity problems on our own lines we may supply a 3rd party with all the bits and pieces and they will basically fill the product for us and send it back.

CSOM: So it's more than simply contract packaging in that sense then?

GCH: Yes.

CSOM: They are assembling the product as well.

GCH: It can be that we would supply them, for example on wash up Morning Fresh, the easiest one or the less sophisticated one if you like is where we supply them with a pre-mix, it's already mixed in our BCs, we supply them with the bottles and the caps and the labels, and they just collate the whole lot and send it back to us and everything's issued free of charge, they're merely providing a filling service for us.

CSO: And from your raw material procurement side are there sort of key categories of material that you deal with?

GCH: Yes, the department is roughly split into 2 main sections and that is packaging and raw materials.

Appendix 4: Example of Case Study Database Summary

CleanCo

Case Study Database: Summary of Key Documents

Focal Firm : CleanCo

Date & Location	Ref	Interviewee	
		Name	Role
July 2001 Head Office	N#01 / T#01	DA	Business Process Controller
	N#02 / T#02	BB	Customer Quality Manager
	N#03 / T#03	CI	Marketing Information Manager
	N#04 / T#04	GCh	Senior Purchasing Executive
	N#05 / T#05	PB	Logistics Controller
	N#06 / T#06	GCr	Business Development Manager (Contract Sales)
	N#07 / T#07	DA	Business Process Controller (Planning)
	N#08 / T#08	GT	General Manager, Factory 2
	N#09	LU	NPD Controller
	N#10	DL	National Field Sales Controller
	N#11	DS	Business Development Manager – (ex ValCo)
	N#12	MJ	Deputy Managing Director
October 2001 Manufacturing Site	N#13	ML	Logistics Planning Manager
	N#14	PB	Process Manager, Factory 1
	N#15	PM	Perpetual Inventory Auditor
	N#16	DC	Logistics Manager, Factory 1
	N#17	PT	Training and Development Manager, Factory 1
	N#18	Contact note numbers not used due to Researcher error. No contacts notes have been omitted purely an administrative error.	
	N#19		
	N#20		
November 2001 Head Office	N#21	ES	Senior Purchasing Executive
	N#22	PMe	Purchasing Manager, fats & oils
	N#23	JW	Packaging Development Manager
	N#24	JC	Customer Service Logistics Manager
	N#25	IW	Business Development Manager
January 2002 Main Warehouse	N#26	DD	Interim Logistics Development Executive
	N#27	PMo	Customer Service Manager
	N#28	JL	Stock Audit Manager, Warehouse
Miscellaneous	28/06/01	DA	Business Process Controller : Scoping meeting notes
	17/10/01	JM	General Manager, Factory 1 : Interview
	18/10/01	PB	Process Manager, Factory 1 : Factory tour notes
	18/10/01	DW	Personnel Manager, Factory 1 : Interview
	10/01/02	JL	Stock Audit Manager, Warehouse
	21/11/01	SM	Customer Service Logistics Manager

T= Transcript, N= Contact Notes from recorded interviews, Date = unrecorded interview

Note: Transcripts were made for the first 8 interviews and then compared to the contact notes prepared within 24 hours of the interview based on field notes to check for accuracy.

Customer 1: VolCo

Date & Location	Ref.	Interviewee	
		Name	Role
November 2001 VolCo Head Office	T #01	NA	Supply Chain Development
	N #02	AT	Health & Beauty Marketing Manager
	T #03	AP	Washing & Bathing Buyer
	N #04	AH	Depot Replenishment Manager
	N #05	JS	General Manager, Brackmills
November 2001 VolCo Store	29/11/01	SW	General Store Manager, VolCo Store
	29/11/01	KS	Warehouse Manager, VolCo Store
	29/11/01	NA	Availability Manager, VolCo Store
February 2002 VolCo Ambient Warehouse	19/02/02	RM	General Manager
	19/02/02	DM	Warehouse Manager
	19/02/02	Richard	Load Planner
	19/02/02	Jo	Bookings
	19/02/02	Cathy	Customer Service
	19/02/02	Kevin	Planner

T= Transcript, N= Contact Notes from recorded interviews, Date = unrecorded interview

Customer 2: ValCo

Date & Location	Ref	Interviewee	
		Name	Role
ValCo Head Office July 2001	T #01	CF	Supply Chain Manager, HO
ValCo Head Office & Ambient warehouse January 2002	N #02	SL	Deputy Manager Ambient SC
	T #03	RT	General Manager, SC

T= Transcript, N= Contact Notes from recorded interviews, Date = unrecorded interview

Supplier: PackagingCo

Date & Location	Ref	Interviewee	
		Name	Role
PackagingCo Head Office March 2002	T #01	AS	Managing Director

Supplier: LogisticsCo

Date & Location	Ref	Interviewee	
		Name	Role
LogisticsCo Head Office March 2002	T #01	PH	Operations Director

Note:
This case study database only lists the primary data sources. Secondary data sources are cited in section 6.0 of the relevant contact notes and this forms the relevant chain of evidence. For the core cases the data base was improved to include all secondary data sources as well.

Appendix 5: Sample Contact Notes

CleanCo
FIELDWORK - CONTACT NOTES

Interviewee	PM	Transcript No.	N#22
Job Title	Senior Purchasing Executive	Date	20/11/01
Contact Details	With held for reasons of confidentiality	Location	CleanCo HO Meeting Room 7

Interviewee Background

- Been here over 25 years
- Always wanted to be a buyer. Started as a buyer want to finish as a buyer.
- PMe appeared to be much more open and honest than ES. He shared his views on where he felt he had been cautious of GCh's ideas, and how he had been proved wrong.
- He also seemed a very down to earth person (called himself Purchasing Manager, rather than Senior Executive), quite straight, a person who would tell you things as he saw them

Main issues or themes arising

Tension between Functions & Purchasing for control of spend

- This has been on the agenda for the last few years as purchasing have been trying to 'seize back' spending
- This is a view shared by GCh who sees the team trying to 'claw back' spend as CleanCo currently has a more traditional manufacturing (or direct materials) focus to purchasing
- Is this all an issue of control? Why is it that purchasing covets this control? Why do the functions want to retain control?
- Alternatively is it about status? How important to functional managers is their size of budget? Is it linked to their personal sense of importance, and their importance in the eyes of their peers?

Tension between Group and UK Purchasing

- Whilst Group and UK Purchasing are 'under the same roof' they are managed independently
- There have been incidences of Group and UK Purchasing buying the same part from the same supplier but not getting a group rate (see ES Slater's contact notes)

- There may be an increasing need for interaction if the company moves towards global purchasing, an item which is on GCh agenda (see ES contact notes)
- The bringing together of the groups has been on the agenda. It is the opinion of PMe that it is 'not an if, but a when'.
- What would be the benefits of centralisation versus the penalties? Is this a politically motivated issue?

The Power of 'Learning by Doing'

- GCh raised a concern that due to the longevity in role of some members of the team there was a 'that's the way we've always done it' attitude which was reinforced by a fear of failure
- GCh also felt it was important to let the purchasing staff realise for themselves that new initiatives can work so they feel the benefit rather than imposing the initiative
- Moving 'raw materials' from requisitions to schedules through the use of brokers is an area in which PMe has 'learnt by doing' and now is an advocate of schedules – a mechanism he was previously very wary of
- 'Learning by doing' is at the heart of business integration. Consolidation of supply base
- Within the bulk raw materials market there has been significant consolidation of the supply base. In the UK there are now only 2 companies supplying SLES. SLES is a product with high water content and it is not cost-effective to transport the product for long distances. Whilst being a commodity product there could be significant cost implications to CleanCo, if further consolidation meant it could not be sourced in the UK.
- Consolidation of the market has also meant that CleanCo has less potential sources of supply, which potentially increases the 'power' of the suppliers
- With the recent acquisition of CleanCo's SLES provider by a US customer, CleanCo's importance to the new business has reduced considerably, though the importance of the site from which they are supplied has increased as a result of site rationalisation. CleanCo is now the site's biggest customer.
- Supply base consolidation is creating some interesting power dynamics and whilst it is clear that the balance of power is shifting, it is not clear where it will end up

Adverserial vs. partnership relations

It looks as if the type of relationship may be a function of where the balance of power lies, which in turn is a function of the product and the supply base (see below).

	Commodity	Customer Specific	High-Tech
CleanCo example	Surfacants	Bottles	Aerosols pump
Power balance	CleanCo	CleanCo	Supplier

Technology	Low tech	CleanCo's specific tooling or software	High tech. Patent protected.
No suppliers	1	2	1
No potential suppliers	2*	Numerous	1
Negotiation process	Quarterly tender	Annual contracts, though tend to be for lifetime of tooling	
Type of relationship	Transactional	Relational (CleanCo have upper hand)	Relational (Supplier has the upper hand)
Strategy	Reduce time for dealing with transactions	Reduce cost. Work with existing suppliers and look for new suppliers, potentially with Group purchasing synergy.	Reduce cost. Look at alternative mechanisms or products that could be used.
Effect on price	Competitive		Less competitive

*Depends on the product. An interesting outcome of industry consolidation has been the reduction in the number of suppliers for what were commodity products. Two years ago there were 10 surfacants in the UK. Interesting to see how this will affect relationships.

Reverse Auctions facilitate cyclical tendering & the 'adversarial approach'

- CleanCo have adopted reverse auction technology to significantly reduce the amount of administration that is required to carry out the cyclical (4 monthly) tendering process for commodity type items
- This is an example of technology being used to simplify administration, provide visibility and facilitate 'adversarial' buying behaviour
- It has also provided a positive experience of the power of reverse auctions to the CleanCo team who are now more likely to consider the technology for other applications i.e. learning by doing

Tension between contingency stock and planning for failure

- It is known that it is possible to get a quality defect on a roll of 125,000 IL labels (see PMc's contact notes). A couple of inches in that roll could stop production. Therefore, as the labels are small, contingency stock is kept.
- However, this could also be seen as a failure to resolve the root cause issue? If the items were large it may not be possible to hold the stock. On the other hand, the exposure in one box/pallet is likely to be a lot less as it holds fewer parts.
- What is the difference between contingency stock and planning for failure? What are the factors that affect it e.g. size, location of supply, units in a box/reel etc? Is it context specific?

Does a drive for cost reduction align with a strategy of product innovation?

- The purchasing team is under pressure to meet some stretched cost reduction targets. There is an increasing focus on cost reduction.
- PMe had a concern that Aerosols (an innovative product) may have been shelved because the cost of the packaging was too high
- However, innovative products are more likely to have technologically sophisticated packaging, with sole supply that does not lend itself well to aggressive price negotiation and cost cutting
- Pursuing a strategy of product innovation may therefore not be aligned with aggressive cost cutting
- If the current focus on cost cutting is as a result of trying to create a platform of 'operational excellence' from which to build the product innovation strategy, that may align, but if it were to continue to be the focus for innovative products, it may undermine the strategy

Order winners and qualifiers

- PMe was familiar with the concept of order winners and qualifiers though he termed qualifiers, 'tie breakers'
- Interestingly, cost was not an order winning criteria. Order winning criteria focused on the consistency and reliability of supply.
- Cost was a 'tie-breaker' along with other ways in which the supplier could bring something new to the relationship
- However, with the current company focus on cost reduction, PMe's ideal criteria may be challenged
- What would be the order qualifying/winning criteria for the other members of the team? How do ideal and reality compare?

Summary of Information Gathered

Role

- Purchasing Manager
    - Fats & Oils – Nottingham
    - Raw materials – anything that is not the packaging
    - Films & Labels
    - Utilities

- Has responsibility for some packaging. Lady (Buyer) that works for PMe, buys films, labels and negotiates utilities for the Group in the UK (HQ, Nottingham, KV and fragrance compound).
- Shirley trying to develop her own portfolio. She does the cyclical tendering.
- There is a trend for purchasing functions to 'seize back'. Has been on the agenda for the last 5 years.
- Would like to get hold of the media spends
- Thinks it is crazy to have Group and UK purchasing under one roof and not talking to each other. There is a debate about whether it should be pulled together as one department. At the moment it is on the back burner again. Probably on GCh's remit. 'Not an if, but a when'.
- Initial concern is that of redundancy. Do get natural wastage. Apart from initial apprehension, could create good opportunities.
- PMe and ES considered as dinosaurs. How do you feel about change? Fine – seen lots. Comfortable with it as long as it is supported. Have been centralised and decentralised 4 times within 25 years.

Supply base

Fats & Oils (Given Christmas 2000)

- £5.5 - £6 million/annum
- True commodity market
- 2 key products
    - Palm oil – driven by Far East market
    - Tallow – driven by US
- Market tracking (get prices daily from brokers and intelligence)
- Have not necessarily taken full opportunity of the world markets i.e. could switch between tallow and palm oil. To do this would need to have a number of recipe cards.
- There have been some spin off teams from the new activities team e.g. Fats & Oils new opportunities group
- At conscious incompetence. Know what want to do, but don't know what to do. Short-term concern. Is there going to be a major backlash if they realise that soap is made from animal fat. CleanCo need to make sure they have soap with a vegetable base.

Tallow Supply

- Tallow in UK only 1 renderer. There are perhaps 6 brokers.

- In the US there are 2 renderers, through 2 brokers
- In Europe, have no direct contact, but have contact through brokers
- Don't set up contract with broker, set it up with renderer
- Believe they get £2/tonne commission, which is paid by renderer
- Liaise with factory to ensure get a balanced grade of tallow. (Tallow – US, USUK?, Ireland & Europe) Liaise with Phil Buckley on a weekly basis.
- Import from US but in 1000T (a boatload). Store in Liverpool, which is then drawn off by the factory.
- If it is European can bring in by 20T truck loads (bring in 5-10 truck loads). Tend to not want to cover 3-4 weeks out.
- Ireland only covers 4 weeks

Palm Oil Supply

- Palm oil is from Papua New Guinea
- Tend to order 500T /month
- If very cheap, may get 1000T
- Potential that may have an issue, that don't need a boat/month
- Why don't you buy from the Philippines? Buy it there because we always have done. As part of Business Integration this has been challenged. Technical people say that the grade being purchased is too high. Buying an edible grade when could buy an industrial grade.

Raw Materials

- Have more suppliers as chemists over the years have used different 'tip ins' that give skin feel etc. PMe terms this the 'pixie dust'.
- End up with a long tail, that doesn't have a high spend
- Shirley has a project to talk to half a dozen distributors with a portfolio of low value items (><? £15k). They may get a better deal as they buy other products. Net result was that it didn't save a lot of money but it did save a lot of time as could use a schedule. I.e. produce 1 schedule with 15 items rather than 15 requisitions. Now looking at >?£20k. Driver was time. GCh had identified that there was a lot of bespoke orders.
- Time is the most important commodity after the bottom line
- Can have 75 suppliers with live orders on them at any one time (total options of 135)
- Not as dynamic
- Have a fairly basic type of formulation

- 2 basic ingredients – SLES (Sodium Laurel Ether Sulphate), Sulphonic Acid – value approaching £5 million
- Historically provided by a company in Stalybridge (less than 10 miles away), as they could undercut on transport costs
- 'Don't bring water across water'
- Use it in Poland, Australia, Thailand, Malaysia and UK. All countries approached their suppliers for global supply. No one could get close to the local cost.
- Raw material industry is changing. Big are getting bigger and the small are disappearing. There are only 2 manufacturers of surfactants you can speak to (10 in UK and 20 in Europe up until 3 years ago)
- US companies are buying up UK companies. Don't see as an issue as it may increase offering to CleanCo.
- Wasn't concerned up until 3 years ago
- Have a pick and choose approach to purchasing
- Some products want the adversarial approach i.e. where there is a range of sources of supply
- Few years ago developed a cyclical tender process, every 4 months now (used to be quarterly). Everyone has a chance to tender, but incumbent gets a second chance. This used to be fairly labour intensive process.
- Have a reverse auctioning tendering site. She puts in the specification, the next cycles volumes and call off rate. Those invited to tender are sent a letter. All the info is downloaded into a spreadsheet and avoids all the effort.

Labels

- Buyer started to report to PMe from September last year
- History (about 5 years ago) says that it was said that CleanCo would be better served through a partnership
- Decision made that would enter into a partnership with LabelCo (near Edinburgh)
- Buyer built relationship up over the last 2 years
    - Set down each iteration with MD and team to look at cost reductions
    - Have full open book costing
- Feeling that had all got too comfortable so started to look at alternative suppliers
- MD came down, and wanted to hear from the horse's mouth why looking at alternative suppliers, response being that it had all got too comfortable
- He feels reassured that perhaps not getting thin end of wedge. Incumbent on LabelCo to stay one step ahead.

- In partnerships need to be totally honest
- Would not have got thanked if their factory burnt down, and had no-one else lined up
- Impetus was Buyer looking outside. Found that 60% of costs were good, but 40% of the costs were not. This could be due to widths etc.
- Purchasers are always under pressure. GCh came in and wanted x% saving. She has set very stringent targets. They are tough and will keep the team stretched all the time. Sometimes can do a lot of the spadework, but may need help from colleagues e.g. technical. Sometimes it can be frustrating, as then become dependent on others' workload.
- Buyer has a portfolio of people who had knocked on door, and she used this as a base for selecting the new supplier.
- Location is not as important for a label supplier:
    - Doesn't take up a lot of space
    - Doesn't cost as much to transfer
- Build in offsets. Know with this label sometimes have quality issues so build in safety stock. This is planning for failure, but haven't really bottomed the issue.

Impact of reduction in soap production

- When upgraded the equipment and trained people, realised didn't need to produce soap 7 days/week. If this situation hadn't changed, then wouldn't have affected supply base. However, it is the drastic decline of the soap market that is affecting the market for bar soap. Having predictions from own market research people that market is dropping at 10% per annum. Now trying to minimise CleanCo's demise by grabbing a bigger chunk. To date purchasing patterns have yet to be affected.
- Business integration has meant that everyone is focused on this issue. How can you reduce costs? Can we increase contract sales? etc.

Changing Suppliers

- Can be more difficult to change as need the support of the technical department and need to trial the product. Everybody needs to buy into it.
- Changing suppliers is more of a team decision. Buyer has recently wanted to change a film supplier. She has asked everyone in the business his or her opinion from technical, service and commercial perspectives.
- Operate with a degree of caution than a cavalier approach

Problem Resolution

- Encouraged to highlight any issues

- Operator to team leader to QC. QC sometimes liaise directly if they know the supplier. In these cases Purchasing just receive a Defective Material Report (DMR).
- Tend to only hear about 'drastic' problems
- Know that will always support them fully if they have a genuine grievance
- Encourage sales reps to liaise direct with the factory
- Every fortnight sit down with factory to resolve problems. Been doing this 4 or 5 months. Has revealed things didn't expect to find. Used to think that no news was good news.
- Meeting attendees:
    - PMe (Nottingham), ES (KV)
    - Site QA Manager/Supervisor (responsible day to day)
    - Soap Finishing production manager (Nottingham)/Production manager for bottle filling (KV)
    - Site logistics personnel (can see problem from both sides of fence) – Nottingham (Chadders)

Re-organising portfolio

- Portfolio split needs to be reviewed
- Got £16 million of raw materials (give 50% to Buyer, but will keep surfacants and perfumes
- £5-£6 million of fats & oils and will give Buyer £3-£4.5 million
- Need to hang on to the remainder as are seen as 'strategic' and requiring PMe's input

Fragrance Chemicals

- 'Coeuring' : Copied P&G and Unilever
- Once but more than 1 tonne/year then consider coeuring. Have a coeuring clause in contract. Fragrance Chemicals trial at the start of the contract and when volumes get to 1 tonne, invoke the clause.
- Takes 30% of the cost of perfume (10% FC, 10% Purchasing & 1% general pot)
- Range for CleanCo £7-8/kg up to £20/kg
- Head of company (DP) is a qualified perfumer and has a young apprentice perfumer (Buyer)
- Got spare time on my hands and got a young perfumer. Would like to quote for briefs. Approached board and got the go ahead. Benefit here is that they would be even more cost effective, as don't have the overheads. Only have 8 people in a little factory in Ellesmere Port.

- They now compete externally & win a high number
- Because of the money can spend have a steering group (marketing – UK & Group, purchasing – UK and Group, R&D) that sits down monthly and comes up with the policy for perfume purchasing. No company in the group can purchase perfume from a non-approved house.

KPIs

- KPIs help you highlight the areas of deficiency internally and externally. Very public.

CleanCo's Performance

- Suppliers only report on CleanCo's performance when asked
- Used to do quite a formal supplier satisfaction survey (but always a concern that they wouldn't tell you the truth as didn't want to upset CleanCo)
- This was the job of the graduate. Used to take a good month from start to end. Highlight areas for attention. Used to make sure that they could track back if could i.e. forecasting not very good vs. forecasting on x is not very good. An attempt to improve communication. Action it and look for improvement. Sceptical as not enough areas for improvement. Suspect now that someone like LabelCo would tell you.

Supplier Performance

- Designed a Supplier Performance Reporting System that captured both objective and subjective measures
- Objective Measures
    - On time
    - In full
    - Right quality
    - All paperwork intact
- Subjective Measures (Opinions?)
    - Account manager
    - Quality of packaging
- Was designed to be done annually, but was asked by manager to do quarterly. It was a very labour intensive process.
- Graduate trainee tried to pull something together for group, but again not useful for UK

- GCh was dismayed at lack of measures when she started. She then investigated with the IT group how supplier information in MFG PRO could be interrogated to get the supplier information.
- GCh under pressure to show to business that suppliers are not a bunch of 'shysters', which current interrogation of the system would indicate. This is because of Crap In, Crap Out syndrome.
- This is because other parts of the business who use the business have not been trained properly and don't set up 'call off' properly
- Also have site meetings (monthly minimum) with logistics and goods receipt people to review performance. If input incorrectly and then change, still reports original figures.
- Have confidence that over next few months will get it right
- Don't measure telemetry performance as if falls below the minimum then it would stop the factory

3rd Party

- Had the 'honour' to run 3rd party for about 10 years
- When GCh started she took on 3rd party
- Given her a poison chalice as it doesn't have any robust systems, as it has been cobbled together outside the existing systems
- She then went off to IT
- RC is an expert on MFG PRO. Knows it better than anyone else in this building. With GCh and Logistics put together some systems. However, when do 'free issue' 3rd party contract there can be weeks' delay in production.
- GCh's solution is to go for 'total issue' contracts. PMe was a bit concerned as GCh was sharing costs and formulations with 3rd party contractors. As a result contractors have phoned PMe and asked how he has managed to get a price.
- 3rd party work is cyclical and that is why we use it

Order Types

- Put under pressure by GCh to put as many suppliers on schedule as possible. Now convinced through the 'pixie dust' project.
- ***Schedules*** – 6 raw material suppliers. Smallish/discrete type deliveries. Not necessarily that frequent. High in number, low in value.
- ***Blanket Order - Telemetry*** – Surfactants, caustic soda. Voice message read out as well as a digital read out. Can phone up and it gives a volume. It is vendor managed between maximum and minimum levels. Within normal working day they can come in any time they like. Has to be supervised, due to hazard. Invoiced monthly by use. Check with own process records. At full tilt, had 3 tankers/day 5

days a week. Went from 15 per week to 1 per month. After caustic introduced it at KV for surfacants. Comes into own if have fair size storage tank in relation to usage. At KV the tanks are a bit small, which reduces suppliers' buffer. Raise a blanket order, for a cycle (4 months) and then raise call off orders each month based on what actually use.

- ***Blanket Order*** – Site do call offs e.g. HCl
- ***Requisitions*** – discrete orders, tend to be raw materials. However have now seen the light.
- ***Open discrete order - special contracts*** – Imported fats and oils and they are sat at Liverpool. The tank farm supervisor (JL) calls up the suppliers and asks for the tankers on certain days. The problem with using the open order is that it makes it difficult to measure supplier performance. Now getting keen on vendor performance management – will need to replace with blanket orders. Only know of issues through contact with JL. Also try to see PMe and JL once per month to talk through issues with them e.g. buy US/Irish, or issues with suppliers.

Power

Tallow

- *Prosper De Mulder* – UK Tallow. Because of BSE unable to export. Most important UK customer, about 80% of tallow business. But also do cooking fats and other diverse things to do with animal carcasses. Overall about 5% of total business. Have a very significant effect on the end price. Can't say we won't let you have it, as CleanCo are the only company that wants it.
- Other suppliers approach CleanCo with materials. Two brokers are going head to head. Bit of negotiation. However can't help feeling that the industry is incestuous. 'Phone calls on ski lifts'.
- 1 broker - 75% tallow commission
- Other - >5%

Oil

- Palm Oil – feel the supplier has the balance of power as CleanCo have historically always purchased from them. Take the average price for the previous month on Rotterdam index, convert from dollars. Don't really negotiate, almost automatic.

Surfacants

- Did have the upper hand (when there was more competition) but feel the balance is moving. Concerned by the consolidation, especially now that there are only 2 in the UK.
- Stepan – number 1 customer from the Stalybridge site. Don't know % as another site has been sold off.

Pixie Dust

- Buy through distributors. Have had a lot of dealings with them over the years. Some have sole distribution rights in the UK.
- Depends on whether it is speciality or commodity and volume

Future

- Life will get tougher. Big are getting tougher and small are disappearing. Have an impact on CleanCo. Don't have time to place 70 orders/week, need to bang out schedules, check performance, negotiate contracts, visit suppliers etc.
- The norm is (order qualifiers):
    - RFT
    - OT
    - IF
    - No quality issues (product and paperwork)
    - Want consistency and reliability
- Anyone that can't do it is not acceptable
- Tie breakers (order winners):
    - Cost
    - Ability to bring something new to the relationship e.g.
        - Exclusivity on raw materials
        - Benefit of their experience
        - Part of larger group (Economies of scale)
- Talk to R&D people – establish contacts with people who are building the products of the future. 'Tip in' become quite fashion driven.
- Starting to get pure cost saving pressure. Think GCh may be under this pressure. This is difficult for her as the world didn't start when she trotted into CleanCo. Have shown her have savings over the last 3 years. Now need to think radical, different, out of box.
- Was concerned that CleanCo wouldn't stick with Aerosols. Concern over cost of packaging.
- What don't have is a lot of money left to advertise. Asked do you do a shampoo? We did but it fell by the wayside. Done a few silent launches.
- Points of differentiation:

  - Service
  - Let us manage your category

- Have concerns about colleagues in sales. Don't want them to give the product away totally. Don't know what their recent tactics are. The retail sector is so sophisticated. Can't pull the wool. Have to bat it straight.
- Don't think at risk as highly unlikely that the family will sell out

Impact of traffic congestion

- Can be difficult to ensure time slots with traffic congestion
- Is it any different for Exel to the cowboys?
- What is the impact on OT deliveries if there is a trend for smaller more frequent deliveries?

Other salient, interesting, illuminating or important aspects

New/Outstanding questions for next visit

- LabelCo in Buyer area's. Falling over themselves to ensure that don't rip business away.
- Stepan. No 1 customer, now have new ownership. What are their plans for CleanCo as most of the product goes into washing up liquid. Aerosols has low volume requirements for SLES.

Supporting documents

None specifically identified

Appendix 6: Example of COE from Contact Notes to Technical Analysis

This is an excerpt from the internal technical analysis report. It is section 3.0 ‘Potential for Increased CR’ as referred to in the contents table in figure 3-13. It shows how specific pieces of data were taken from contact notes and were then used in the technical analysis either as narrative or in data arrays using content analysis. Data used in this way have been referenced back to the original contact notes through surname and ‘contact note’ number.

Potential for Increased CR

Potential for Customer Focused Segmentation

Grading

'Looking towards grading customers, but it's an emotive subject. It's really about making allowances for transport and infrastructure'. (BB #2)

'Which needs of which customers do we wish to meet' (PB #5)? A key driver for this has been the consideration about what to do with small customers, and have made a decision to increase the MOQ from 50 to 100 cases. 'Sure that the needs of small customers could be met more effectively through other mechanisms' (PB #5).

'Can't be all things to all men. Need to be choosy in terms of customers, products etc.' (PB #5).

Differentiated Approach

Don't treat 'Aerosols' the same as 'bar soap'

- Aerosols – concentrate on quality e.g. be prepared to run smaller batch sizes
- Bar soap – concentrate on cost e.g. rescue costs for packaging process, not so concerned about marks

Need a general strategy to set the direction, but then deal with everything on a 'case by case' basis (GCh #4)

It became apparent that there are some significant differences between ValCo and VolCo – the accounts that Ian deals with. The difference both in the competitive positioning of these two customers, balanced with the competencies that the companies have, drives different supply chain responses e.g. ValCo who have robust systems, only one depot and a perception that they are 'quirky' are willing to do Quick Response whereas VolCo with less robust systems, three depots, a much larger operation want all systems to be the same and hence each depot orders 2-3 times/week. On the surface this would appear to support Gattorna's model, but it would be useful to explore if these companies are strategically aligned.

	VolCo	ValCo
CleanCo turnover /annum	£10 million	£1-2 million
Time spent with account	80-90%	10-20%
Relationship	Good, but more difficult than ValCo	Good relationship
Customer Strategy	Promotions + EDLP	Promotions. Quirky, will sell higher value products that are 'different'
Promotions	Full range. Can be quite 'deep' due to size of account	Yet to do BOGOFF (cash funding issue)
Number of depots	3	1
Order & Delivery Pattern	Order and deliver to each depot 2-3 times/week.	QR. Deliver 5 days/week.
Order lead time		Same day
Customer Forecast	Yes	No
Customer forecast accuracy	More noise in system due to deeper promotional activity	Driven by real sales through QR
Customer Category Plan	Yes	No
Buy Competitive Data	Yes	No
System	CPS	ValCo Connect
System Discipline	Poor. Still input data manually when have a computerised system. Extends to store discipline.	Good.

It is also recognised that customers are following different strategies. Five years ago retailers would take the majority of margin improvement offered and not pass it on to the consumer, but two main strategies are now emerging (DS#11):

- VolCo – drive volume to drive efficiency (best way to increase profits is to increase sales)
- ValCo– improving the margin on the product you sell
- RetailCo – hybrid, use a Hi-Lo policy the aim of which is to pull people in who will then spend money on the higher margin products

This differentiation in customer strategy will drive differing strategies across the supply chain. As a supplier to all these customers, you need to be in a position to 'align' with each of these strategies.

Potential for Strategic Alignment

It's about identifying your size and how you can affect the market. It's about strategic fit. (PM #15)

Leadership

MD had previous experience of Stratabridge (as Oliver White) and had been through the Business Integration process at previous company (PB #5).

Horizontal Alignment – Scalability

'Trying to build a relationship with a wholesaler (DCS) that already offers a 'banding' service for P&G and Elida Faberge. DCS were talking to Makro and all the suppliers and realised that they could provide this 'banded' service if they did it for all suppliers and customers' (DL #10).

Perceived Enablers - Ways of achieving alignment

Enabler	Example
Try to develop cultural fit internally	'A main objective about the business integration process is about changing behaviour' (PB #5)
Look for cultural fit externally	'Need to cherry pick the parts that fit with CleanCo culturally e.g. currently have a limited level of IT and systems skills, which also applies to other supply chain practice' (GCh #4)
Joined up thinking	'It's about linking strategy and tactics at the coalface' (PB #5) 'The ability to link functions and for everyone to think beyond their own role' (DD #26) Moved to a point that now 'concerned that we could be optimising heads on site, not for the entire supply chain' (GT #8)
Business focus	'Run the business as a business not as a series of functions' (PB #5) 'Am I thinking logistics or am I thinking business wide' (PB #5)
Visibility	'To change the culture you need to make things visible, and this can be a bit painful' (MJ #12)
Size	'Had sufficient visibility of the chain to see the whole chain therefore could make trade-off decision. Enabled by relatively small size' (PB #5) 'About identifying your size and how you can affect the market. It's about strategic fit (PM #15) 'It is better to be a large fish in a small pond, rather than a small fish in a large pond', 'Synergies of size: CleanCo of the closures world' (ES #21)
Phase handovers	'There is more of a hand-over period than a hand-over point' (JW#23) The point handover didn't work, as it was difficult to understand the thought processes and history behind the decisions. It was a bit like reading the minutes rather than attending the meeting' (JW #23)
'Mental agility'	'The ability to challenge and think beyond your role and historical way of doing things' (DD #26)
Value alignment	'It is important to make brand objectives dovetail into the customer plans otherwise you lose the brand', 'The soapbox shouts value, in line with the VALCO value proposition' (DS #11)
Flexibility	Flexible manufacture through standardisation and postponement, so you only need to clean the parts that do colour and perfume' (MJ #12) Have quite a few product launches coming up that are more niche, gives better flexibility externally, with customers e.g. Boots only want value added products (MJ #12) Constantly looking for flexibility in the system (PM #15)
Focus	CleanCo have set up a dedicated production line for J&J (ML #13). Supports views of focus from a manufacturing perspective (Skinner, 1974) and organisational perspective

Perceived Inhibitors – factors that inhibit alignment

Inhibitor	Example
Lack of Cultural Alignment with CUK	'That's the way we've done it attitude' (GCh #4) 'Fear of failure' (GCh #4) 'Culture mismatch – try new things at board level, but don't want to change at lower levels' (GCh #4) CleanCo culture was 'If I leave things alone for long enough it will go way' (MJ #12) People have entrenched views of what their job is and do not feel responsible to work past their contracted hours to complete a task, or to expand the scope of their job past their job description (DD #26) 'There is a tendency to do things as they have always been done' (DD #26) 'Stuck in functional silos' (MJ #12)
Lack of Alignment with CIL	'2 masters, the group and the UK' (PM #15) CIL is a different culture again, 'the them and us is too strong' (GCh #4) The introduction of global brands has caused some tension between CIL and CUK (JW #23)
Lack of Alignment between senior managers and middle managers/staff	'The management team are on board, but whether they are influencing the operators in the right way is still questionable. The operators are still very output focused' (DC #16) Top-level management focus on site is cash, but at the middle management and shop floor level the focus is output. (DC #16)
Sub-cultures	'Staff in the aerosols work as a team far more than SFR people' (DC#16) Aerosols very much see themselves as team players, culture in SFR 'this is my job and I don't do anything else' (DC #16)
Tension between centralised and decentralised functions	Logistics don't bolt, gel or combine with site very well because they feel affiliated to head office (PM #15) Having centralised functions can be very difficult e.g. Purchasing, if there is a quality issue (PM #15)
Disconnect between those responsible for input and the output of data	Used to run a very good vendor performance system, but when moved all the ordering to site (logistics), it was not as controlled as when it was done by purchasing. There were delays in updating the system, which meant that the purchasing team needed to interrogate the system manually (ES #21).
Lack of business focus	'Seems a shock to people that CleanCo is here to make a profit, not just to serve the employees' (DD #26) 'A lot of people in this organisation have never worked outside the organisation have never worked outside the business, and have no real cash awareness' (PM #15)
Visibility of stock shortages	The trade misuses stock shortage information, by over ordering to ensure they maintain supply, therefore try to be discrete about shortages (BB #2)
Key Account Management	If everyone buys into and owns the supplier as a team, there can be strong resistance if the supplier needs to change. How do you manage this? (GCh #4)
Coding – same words, different meaning	When doing the 2nd iteration of the business integration process, have found that we were not talking about the same things (PB #5)
KPIs not aligned with the customer	A lot of the measures are introspective, and only a relatively small number are customer focused. This is expected to

	increase, as there is a move from measuring performance at product rather than factory level (DA #7)
Different units of measure	OEE by manufacturing managers, operators count cases and accounting want it in dozens (DC#16)
Tension between marketing and manufacturing	Have a concern that sales and marketing think that manufacturing is totally flexible and don't realise the constraints (GT #8) Historically CleanCo was a very marketing driven company and marketing drove all NPD activity even if it was at manufacturing's expense (LU #9) Increase the product margin, and get a way from the marketing wish list (MJ #12) 'CleanCo are let down by their back end processes and efficiency of the factory' (DC #20) Recently there has been a move to rationalise shower gel bottles from 3 to 1, production would like to do this with other bottles, but marketing like a point of difference' (ES #21)
Tension between logistics and manufacturing	Manufacturing expect rate reductions to be implemented immediately, but are less quick to increase the rates even if the demonstrated performance suggests that they should be increased. Causes problems for logistics as manufacturing are then continually running ahead of plan (DC #16) Logistics say this is how we want to plan it, but production want to do it a different way e.g. if production change the line that an order is scheduled down, this creates a lot of work for logistics to re-schedule. It is important, as MFG uses the WOs to calculate work centre efficiencies. (DC #16)

Gap Analysis

Value Synergy - Strategic Alignment with Customers

IL is a middle of the road brand aimed at:

- Older consumers
- All the family

ValCo have a particularly good relationship with CleanCo, and CleanCo have a disproportionate amount of space in ValCo stores (IW #25) which is believed to be due to good relationships developed over time. However, perhaps a different way of thinking about this, would be that the IL brand and its appeal to the older consumers 'aligns' with the ValCo store demographics.

Similarly, CleanCo may have success in Asda as the IL brand is aimed at providing value for all the family, which aligns with the Asda strategy. Evidence that this is beginning to be taken on board by NAMs e.g.

'NAMs are increasingly expected to deliver creative individualised solutions rather than standard solutions. It is important to make the brand objectives dovetail into the customer plans otherwise you lose the brand. A creative solution with VALCO was the soapbox. IL was on a roll back and so therefore couldn't do a traditional 1/3 off promotion. The soapbox shouts value (in line with the VALCO proposition)'

Interestingly, CleanCo have a role in merchandising in both these stores, which is believed to be driven by CleanCo's capability in this area, and their ability to be impartial. To what extent is this true? Or is it really driven by value synergy?

Strategic Alignment with Supply Base – A function of size?

Supply chain partners of a similar size, tend to achieve better strategic alignment, than those where there is a large difference in size.

'It is better to be a big fish in a small pond, than a small fish in a big pond' (ES #21)

'Don't have the value of spend to do a global board agreement' (GCh #4)

Lean vs. Agile

'If we have very robust (system orientated) inventory planning systems, they will struggle to deal with periods of change' (PB #5) – supports the Leagility paper perspective (Naylor, Naim, & Berry, 1999) that needs level scheduling planning tools for stable or 'lean' demand and flexible planning tools for unstable or 'agile' demand .

However, are all new products necessarily going to have unstable demand?

Distributors – Increased or reduced supply chain complexity?

One of the four material flow principles advocated by (Towill & McCullen, 1999) is the Echelon elimination principle. 'This involves the elimination of echelons and functional interfaces, reducing time delays and the information distortion which precipitates demand amplification, but may lead to a substantially different channel of distribution.'

The increased use of distributors to deal with field sales increases rather than reduces the number of echelons involved in the field sales supply chain. As field sales only account for 30% of total sales, over the last 10 years CleanCo have not focused on this area and as a result have lost the capability to serve multiple distribution points (there is no infrastructure, which makes the deliveries very costly). In turn this has seen an increase in the order lead time offered to these accounts from 24 hours to 10 days (DL #10).

'Were more customer responsive 18 years ago than now, could take an order on a Monday and deliver on a Friday' (DL #10)

There is therefore a trade off between horizontal alignment (or scalability) and the Echelon elimination principle.

Channel or Supply Chain Strategy Conflict

The strategic alignment model advocates the development of supply chain strategies to meet different behavioural segments. Whilst CleanCo do not formally do behavioural segmentation there are some key differences in the 'augmented product' required by the national accounts and field sales.

- National accounts – reliable and consistent supply, quality product, price sensitive (but not number one driver)
- Field sales – price sensitive, cheap product, bulk supply of discounted product and end of lines OK

This can lead to a conflict of interests as:

1. Field sales erode the price premium of products e.g. £2 and £3 market for foamburst
2. Price gap drives 'grey market' behaviour, which in turn can erode the image of products if old and new stock gets mixed up on shelf

How does CleanCo co-ordinate the strategies between the different 'behavioural segments' to overcome strategy conflict?

Role of the Brand?

No. 1 factor is the strength of the brand. The more power the brand has, the greater the power of the supplier. (DS #11)

How does this affect, strategic alignment? Does it drive the behavioural segments? Is it an enabler or inhibitor?

Promotions

Promotions impact on the planning process in the following way (ML#13):

- Require new SKUs
- Planning system cannot translate the rate of sales predicted by the forecasting tools, into the block orders that are required as a result of stock 'campaigning' i.e. 60-70% of the stock being required for pipeline fill before the start of the promotion. ML needs to remember the campaigns and adjust the plans manually.

Campaigns create spikes of demand due to the block delivery of the majority of the campaign stock before the promotion begins

Are they a separate behavioural segment?

Offering the customers services they do not want – an indicator of misalignment?

CleanCo introduced the role of Customer Logistics Manager, to liaise with the customer to develop logistics. Initially were four CSLs, but now there is only one left, and customer liaison is only 20% of the role. It appeared that the customers didn't have a need for this type of logistics development. Is offering the customer something that they do not want an indication of lack of strategic alignment?

Stuck in the strategic middle

CleanCo brands are 'middle of the road' (CI #3)
Don't have the value of spend to do a global board agreement (GCh #4)

Appendix 7: Excerpt from Cross-Case Analysis Emerging Themes Report

This is an excerpt from the cross-case analysis emerging themes report that was written after the CleanCo and 4PLElecCo case studies. Its purpose is to show how cross-case themes emerged from the technical analysis of the individual cases. It includes the contents page for the full 13 page report and the first full section of the report

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Emerging Themes

The purpose of this paper is to report emerging key themes from the cross-case analysis. Whilst the analysis is still awaiting completion, these themes are of a tentative nature[101] that provide a good guide, but have yet to be fully explored.

To date detailed analysis has only been completed for the CleanCo UK and 4PLELECCO /Cisco case studies. However, as part of the data collection process and through the more superficial analysis of data for conference papers, some analysis of the other cases has taken place. A pictorial representation of the key technical themes to be explored is summarised in figure 1. Each of these themes is then explored in turn in the following narrative.

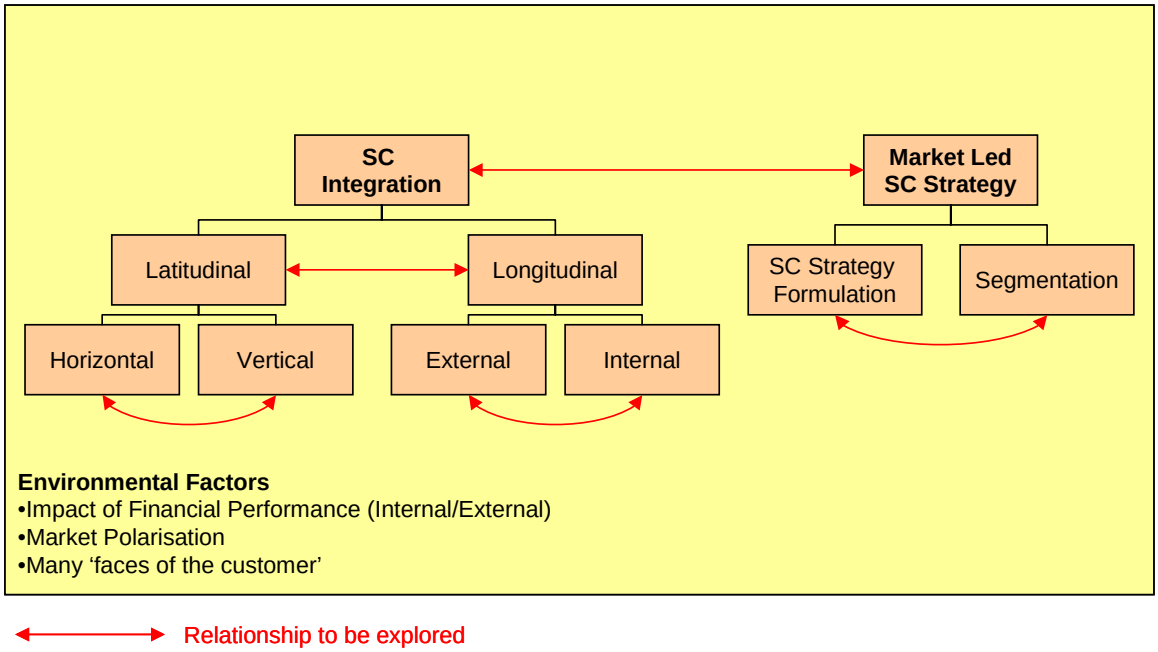


Figure 1: Key Themes for Exploration

Supply Chain Integration

One of the key themes for exploration is that of supply chain integration. The findings from the research so far raise the following questions:

- What is the degree of 'longitudinal' integration both internally and externally across the supply chain?
- What is the degree of 'latitudinal' integration both internally and externally across supply chains?
- Is supply chain integration an 'ideal' state that will never be achieved? Is a more realistic challenge that of supply chain alignment?

[101] Have been developed using the first 3 steps of the grounded approach to qualitative analysis (Easterby-Smith, M., Thorpe, R., & Lowe, A. 1991. ***Management Research: An Introduction***. London: Sage.)

These themes can be explored independently, or linked to consider a supply chain's position on the Supply Chain Longitude and Latitude matrix illustrated in figure 2.

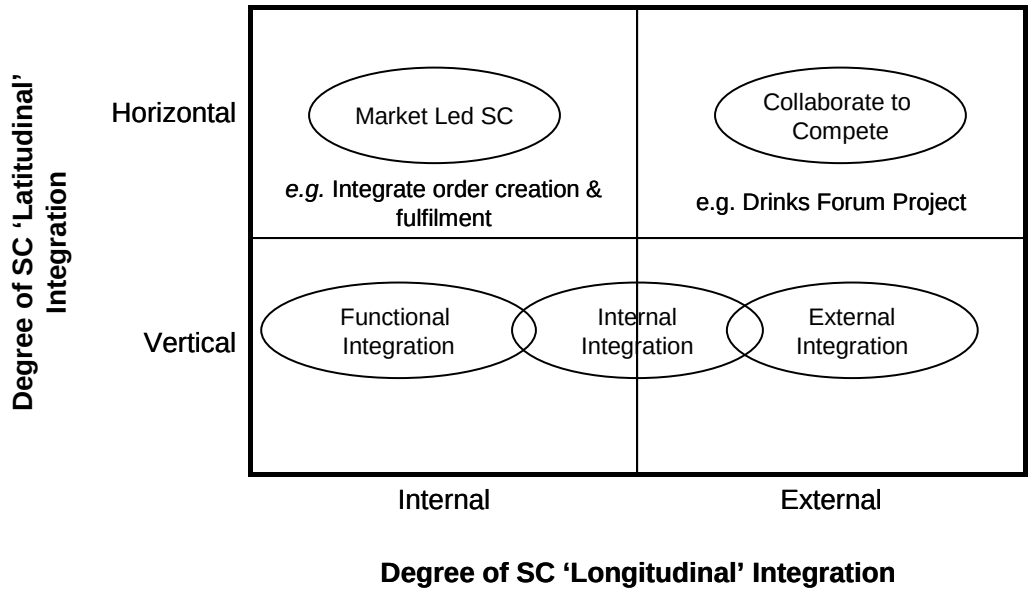


Figure 2: SC Longitude and Latitude Matrix

Research findings to date have indicated that:

- There is a limited degree of internal integration 'matrix twist'
- External supply chain integration is enabled by the use of a 3PL/4PL
- The 'scalability' issues of some supply chain strategies may require a degree of latitudinal integration to achieve their full benefits

Each of these findings is briefly described below.

Limited Degrees of Internal Integration (Matrix Twist)

There was a limited degree of internal or functional integration within the organisations studied. The organisations studied were at the 'baseline' or 'functional' integration stage of supply chain integration (Stevens, 1989). This was indicated by separate functions for the main SCOR activities of plan, source, make and deliver, and functional specific KPIs. There was a drive towards organisational structures that had specific supply chain responsibilities (e.g. Nortel Networks) at a strategic level but this was not fully reflected at a tactical or operational level.

Further work to explore this theme:

- Develop a taxonomy to categorise internal organisational structures and approach to SCOR activities
- Plot each individual organisation studied against an agreed supply chain model to illustrate degree of internal integration

Role of the 3PL/4PL in achieving External Integration

The supply chains that had the greatest degree of external integration (e.g. 4PLElecCo/ElecCo) used a 3rd / 4th party to 'manage' the supply chain. However, the models for the way in which the 3PLs had been contracted and evolved were very different. 4PLElecCo had been contracted by ElecCo as specialist logistics providers and recruited their own staff independently. KNLL developed as a direct result of NN wishing to outsource logistics activities and whilst it is owned by K&N, the staff employed are largely ex-NN employees. There is also a stark contrast in the way that the 3PLs/4PLs operate. The 4PLElecCo model is driven by systems and the flow of data, where as the KNLL model is highly dependent on relationships.

Further work to explore this theme:

- Develop a taxonomy to categorise external supply chain structures and approach to SCOR activities
- Plot each supply chain studied against an agreed supply chain model to illustrate degree of external integration
- Explore the possibility for a systems/relationship continuum of 3PL/4PL mode of operation

Horizontal Alignment – Co-operate to Compete

Whilst the 'Quick Response' service offered by CleanCo is seen to add significant quantifiable benefits to ValCo, ValCo is not in a position to demand this service from all suppliers, as it cannot deal with daily deliveries from over 900 ambient suppliers each day. A solution may be to have daily category deliveries (e.g. as proposed by Exel for beverage deliveries) but this requires:

- Co-operation between competitors
- Significant supply chain re-design

Further work to explore this theme:

- Consider other cases in which horizontal alignment is an enabler/inhibitor to supply chain development
- Understand the barriers

REFERENCES

Easterby-Smith, M., Thorpe, R., & Lowe, A. 1991. ***Management Research: An Introduction***. London: Sage.

Stevens, G. C. 1989. Integrating the Supply Chain. ***International Journal of Physical Distribution & Materials Management***, 19(8).

Appendix 8: CleanCo: Detailed SWOT Analysis

STRENGTHS

Good Brand Heritage
- Brand X strong brand recognition
- Brand Z – association with antibacterial liquid soap
- Brand names (balance of tradition and long established brands with new and radical technology)
- Key brands: Brand V, Brand X and the sub-brand Brand Y
- Good brand heritage (x2)
- Positioned to develop 2 of the global brands from the UK

Established Company
- Tradition
- Good company name
- New Product Development
- Technical competence, can deliver 'wow' products
- R&D expertise
- Technological expertise
- Niche products (x2)
- NPD process

Strong Financial Performance
- Good financial year 2000-2001
- Cost savings coming out of manufacturing
- Strongest position ever, just had a good financial year

Promotional Strategy
- Advertising – total package
- Success of "Duck" advertising campaign (use BDA, a Manchester based firm)

Processes
- Sound process infrastructure (but not joined up)
- Lots of good processes and infrastructure e.g. 'quick response'
- Business Integration process

People
- People – longevity - like working here, built up a skill base
- Low staff turnover
- People – experience, commitment to company
- People – creativity

Customer Relations
- Have a thorough understanding of customer and supply base. Stronger relationships with customer base than have experienced in the past, company wide recognition of the customer.
- Perceived by customers to be more flexible (don't have global brands so can adapt to UK requirements)
- Good customer relations through personal relations (e.g. first barcode was CleanCo), but staff turnover at customer is eroding these
- Good payment terms
- Regional business – can respond regionally
- Have sufficient critical mass to be important to retailers
- Delivery performance reputation

Communication
- Good communication. Regular communication from the board.

Flexibility
- Use smaller size to be more flexible and deliver real value to the customer ('Guerrilla tactics on a global scale')
- Small focused management team, undergoing step change in level of ambition
- Will informally work together to support the business without requiring formal recognition on organisation chart
- Not subject to true stock market pressures
- CCIL, fairly protected, but subject to major stock market trends
- Cost effective warehousing

WEAKNESSES

Ageing Brands
- Brand X associated with bar soaps – middle road, all family, male orientated
- Brand Z –brand stretch difficult as associated with hand washing

People
- People – longevity – inertia to change
- Longevity – can be stale (need to bring in fresh ideas)
- Low staff turnover – stale?
- Ageing sales force (need new ideas)
- Limited opportunities for staff as a lot of old timers in senior positions, and employees have less opportunity to work abroad than they used to
- Skills Gap – e.g. financial understanding of P&L/general business understanding
- Low morale
- People Development

Culture
- Conservative – risk adverse ('do the same to get the same')
- Willingness to put up with an unsatisfactory way of doing things
- Chauvinistic (more northern you get, more chauvinistic – small number of female senior executive in the company)
- Fear of change
- Short termism / fragmentation of projects
- Should be more assertive, more powerful
- Takes a long time to get things done as like to 'do things properly', and as a result opportunities might be lost
- Emphasis on rules and that's the right way to do things

New Product Development
- Only developing 'add-ons' to brands not new brands – could argue that you really need a 3rd brand in the washing and bathing sector
- Not enough NPD (?) left in current markets
- Bar soaps are tallow based, if vegetable based are the way forward then need to understand implications

Size - Regional not Global Business
- Geographical location (UK target)
- Small company, small turnover – difficult to compete with likes of P&G
- Northern base when most major customers are in the south
- Regional business – can't respond globally (if we were called upon to)
- Pockets aren't as deep as the global players (e.g. couldn't launch soap powder in the UK)
- Competitors – if bigger, can ride a price war better, if this happens CleanCo will need to find a niche
- Small and smaller player in growing field

Poor infrastructure & processes
- Warehouses inefficient
- Poor supply chain infrastructure
- 60 days FG stock
- Forecasting (x2)
- Lack of current integration
- Missed opportunities for joint learning with the Polish operation
- Inefficient

Promotional Strategy
- Sales volume not growing at the rate that it should be. Why? Raises questions such as how effective is S&M activity?
- Lack of promotional feedback

Customer Intimacy
- Don't fully understand the nature of VALCO and Tesco

Politics
- Politics between CCIL and CC make things a lot more complicated trying to keep everyone happy (perpetuated by "illegal" power holders)

Historically Weak Financial Performance
- Funds to invest in the business
- Poor past financial returns
- Don't make enough profit (8% ish), but this is measured by CCIL (and the family)

OPPORTUNITIES

Brand
- Brand X upgrade image e.g. Brand Y
- Brand Z – how to introduce to the bathroom
- To truly develop Brand Z as a international brand (currently UK)
- Manage the tail a lot better (discipline on run outs)
- Brand franchises e.g. Brand X
- Opportunity with brand (everyday family brand) in bathing

Products
- Develop bath liquids
- How to rejuvenate sales in shower gel and MBW – new brand?
- Vegetable based products
- Develop the liquids business to drive market growth through NPD
- Move more towards niche products e.g. shower bar
- Produce international products that look the same on the outside, but are different inside (e.g. Far East likes stronger perfumes)

New Product Development
- Flex technical competence to deliver innovation in sector
- Buy R&D from P&G, Unilever as they standardise

Size
- Size offers potential to be nimble
- Relative small size, means that if get a 'can do' attitude then can continue to 'punch above our weight'
- Relatively small and therefore should be able to adapt to change more quickly e.g. buying smaller brands from larger players
- Maintain a good regional presence in the UK

People
- People – balance old with new

Financial – Reduce Cost Base
- Exploit total cost saving opportunities. A lot more to go at (reassuring).
- Massive potential to take 'waste' out of the business and Business Integration will help to achieve this
- Refocusing on operational costs – change of emphasis to liquid products

Customer Relations
- Become a more 'desirable' account through consolidation of business.
- Quarterly reviews with Customers
- Good future with Tesco as unlikely to be bought out

Supplier Relations
- Utilise technology to help suppliers (e.g. extranet)
- Need to be aware of technology and need to use appropriately. Don't want to be viewed as a poor customer. Want to be a key account, someone they want to deal with.
- Once done this can apply to a bigger chunk of business either through organic growth or acquisition

Culture
- Be a lot more open and honest
- Business in learning & growing phase
- Stop making things complicated because we can

Business Integration Process
- Business integration process should give a wider view and avoid the end of year 'door shutting' (x2)

Manufacturing Flexibility
- Use contract manufacturers to launch new products, and get the product learning
- Source more products from overseas (had to move abroad due to cost of H&S features in the UK)
- Think more globally – how to leverage the Group's assets more effectively? E.g. factories, purchasing strategy.

THREATS

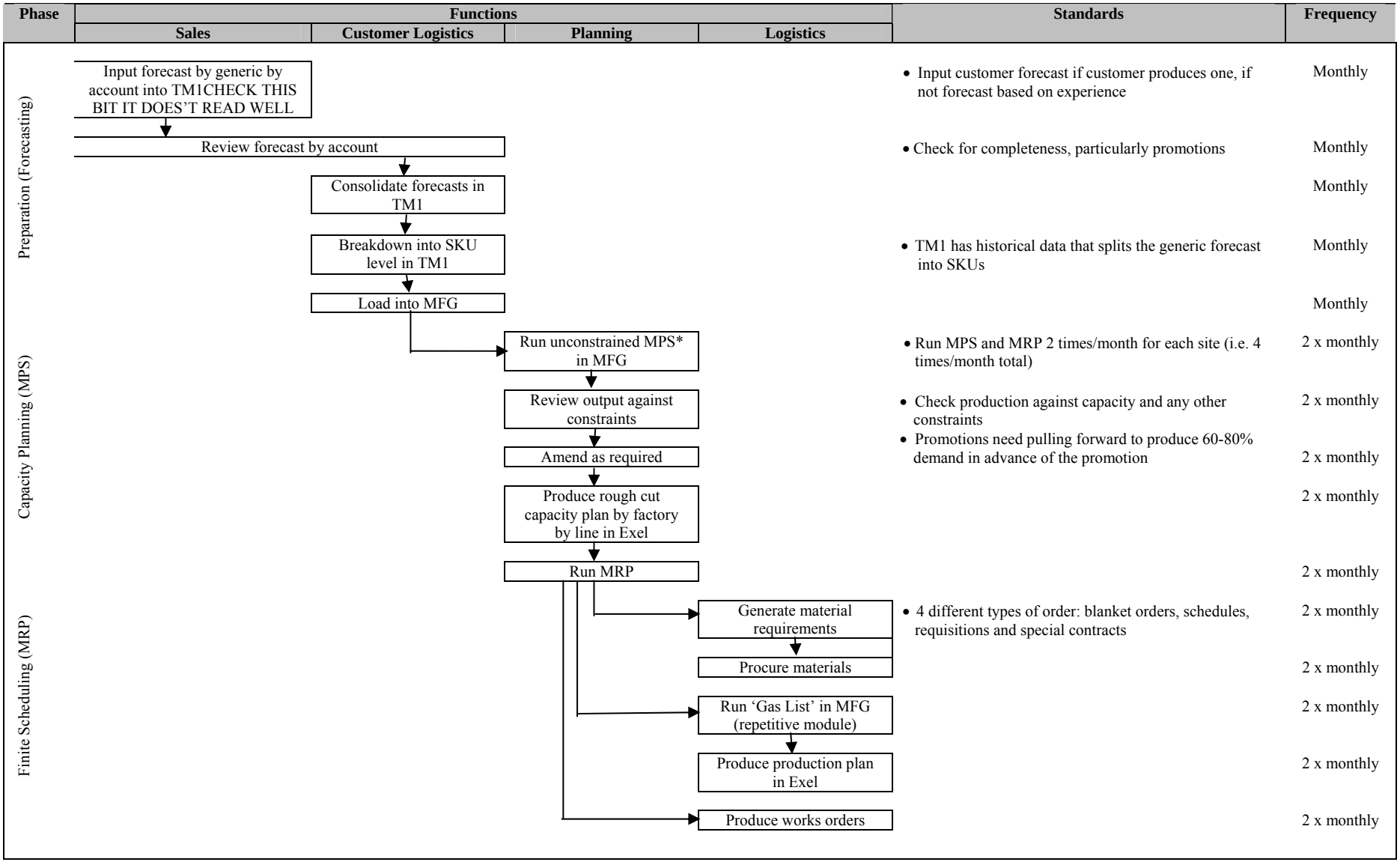
Environmental
- Packaging issues
- Health & Safety
- Can't sell UK sourced tallow abroad because of BSE, F&M etc.
- Take Over Bids
- Prior to this year financial performance not so good
- Traditionally bar soap manufacturer and brand (refocusing profitability)
- Last UK manufacturer of soap
- Decline of bar soap, other markets fairly flat – what is the future?
- Soap is a dramatically declining market (a more profitable business than liquids)
- Plateauing liquid soap sales (volume growing but margin declining)
- Mature Brand Z brand, not transferable
- Household No 3 brand, Brand U, underdeveloped
- Washing up liquid market mature and can only ever be number 2
- Carpet cleaning, 50% market share (declining market) (x2)

Erosion of Competitive Position in the UK
- Loss of strategic supplier status due to small scale
- Consolidation within customer base
- Becoming further removed from the marketplace
- Seeing volume growth but not profit growth (margin reduction), as a result of external price pressure. Prices are being reduced quicker than costs can be reduced.
- Own brand liquid soaps. Don't necessarily want to contract pack own brand product as further erodes brand image.

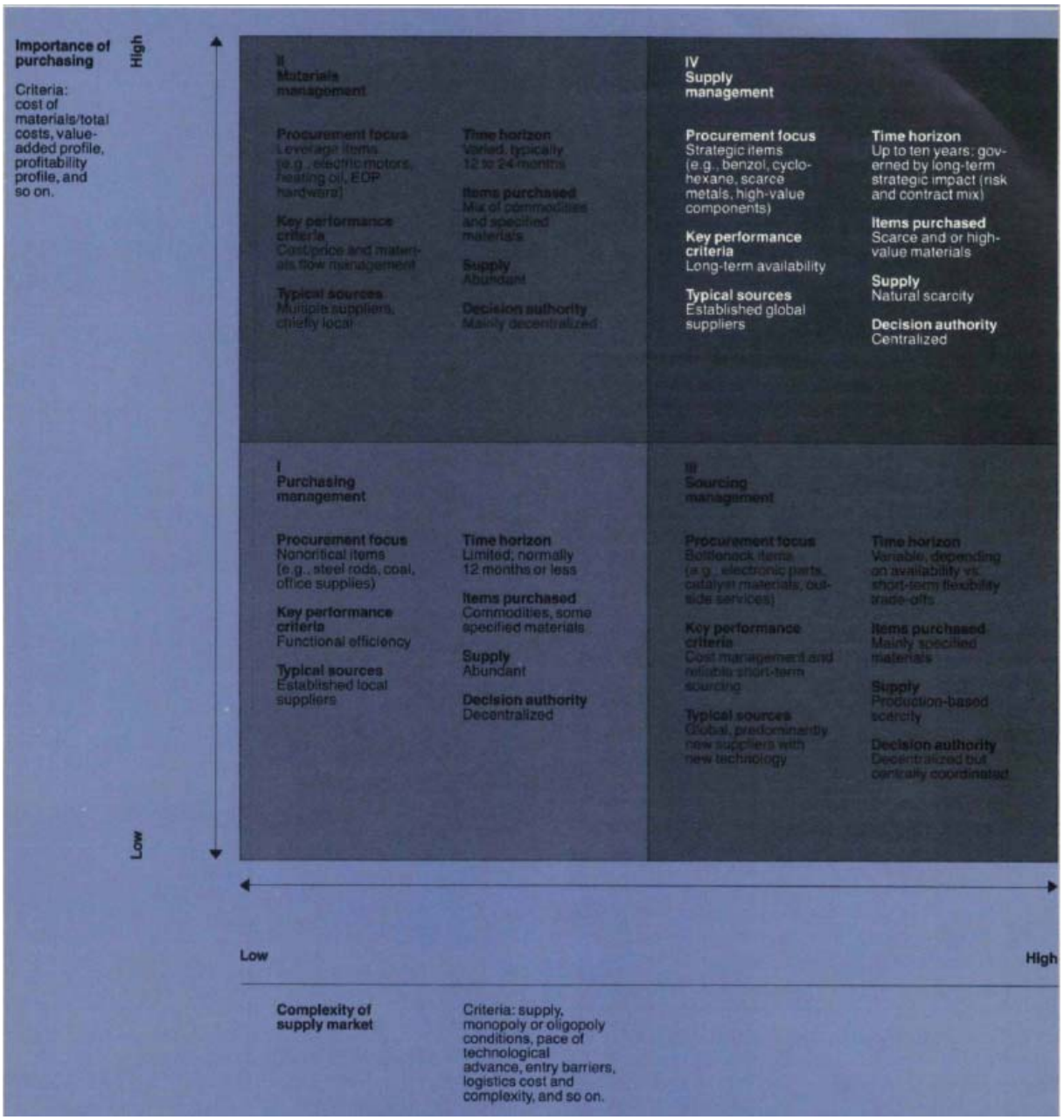
Multiple pricing issues
- Own-label undercutting
- Increased promotional activity – are they trying to buy increased market share? What are they going to do with this?

Globalisation
- US competitors (Dial Corporation if they wanted to get into liquid soap in the UK)
- VALCO may shut out UK companies due to US influence
- Increased globalisation (VALCO just the start), and CleanCo don't have a Western European presence outside of UK
- Not a global player, therefore the global retailers may only want to deal with global supplier
- Slow to react to globalisation, Tesco in Far East, Thailand, Poland
- Increasing UK manufacturing cost – people more expensive, climate control level, wastes levy, utility prices etc.
- Changing media channels
- WhatHow? is the advertising medium going forward? Have tended to use mass market advertising mainly through terrestrial TV, now have many more media).

Appendix 9: CleanCo: Planning Process


Phase
Functions
Sales
Customer Logistics
Planning
Logistics
Standards
Frequency
Preparation (Forecasting)
Capacity Planning (MPS)
Finite Scheduling (MRP)
Input forecast by generic by account into TM1CHECK THIS BIT IT DOES'T READ WELL
Review forecast by account
Consolidate forecasts in TM1
Breakdown into SKU level in TM1
Load into MFG
Run unconstrained MPS* in MFG
Review output against constraints
Amend as required
Produce rough cut capacity plan by factory by line in Exel
Run MRP
Generate material requirements
Procure materials
Run 'Gas List' in MFG (repetitive module)
Produce production plan in Exel
Produce works orders
• Input customer forecast if customer produces one, if not forecast based on experience
• Check for completeness, particularly promotions
• TM1 has historical data that splits the generic forecast into SKUs
• Run MPS and MRP 2 times/month for each site (i.e. 4 times/month total)
• Check production against capacity and any other constraints
• Promotions need pulling forward to produce 60-80% demand in advance of the promotion
• 4 different types of order: blanket orders, schedules, requisitions and special contracts
Monthly
Monthly
Monthly
Monthly
2 x monthly
2 x monthly
2 x monthly
2 x monthly
2 x monthly
2 x monthly
2 x monthly
2 x monthly

Appendix 10: Kraljic (1983) Matrix

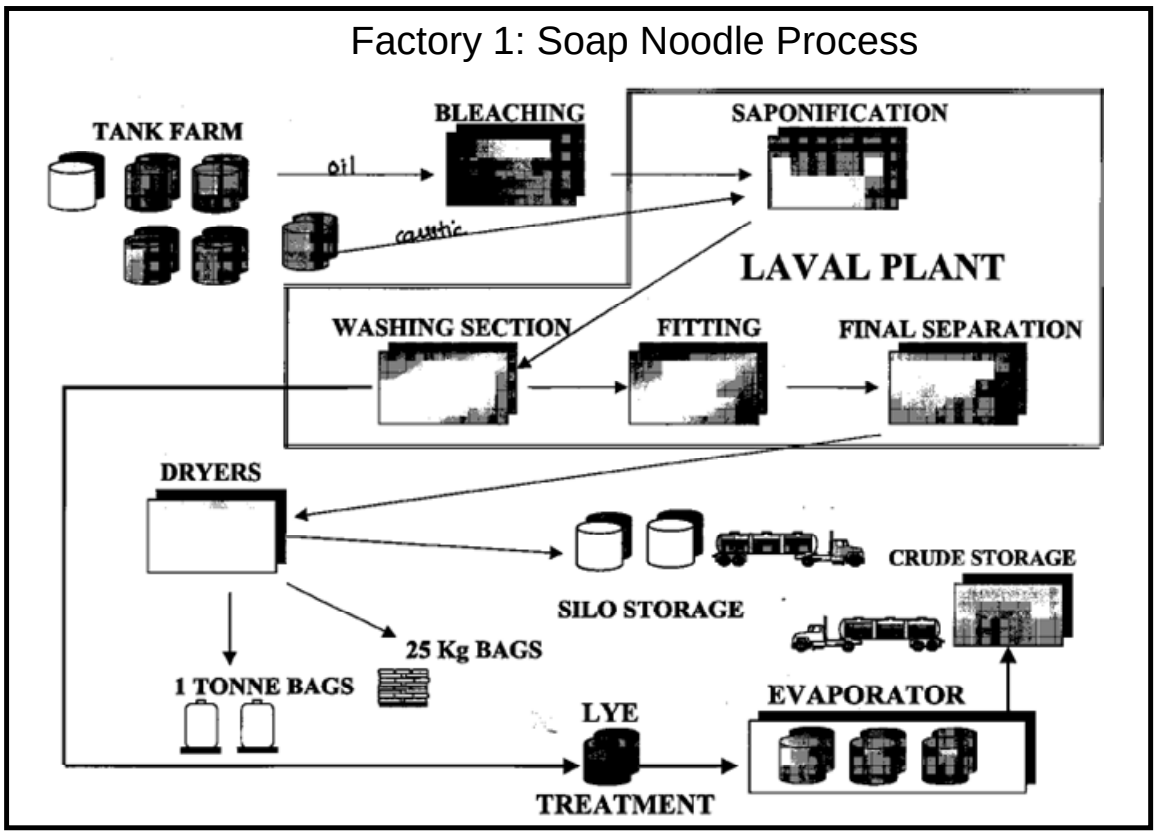


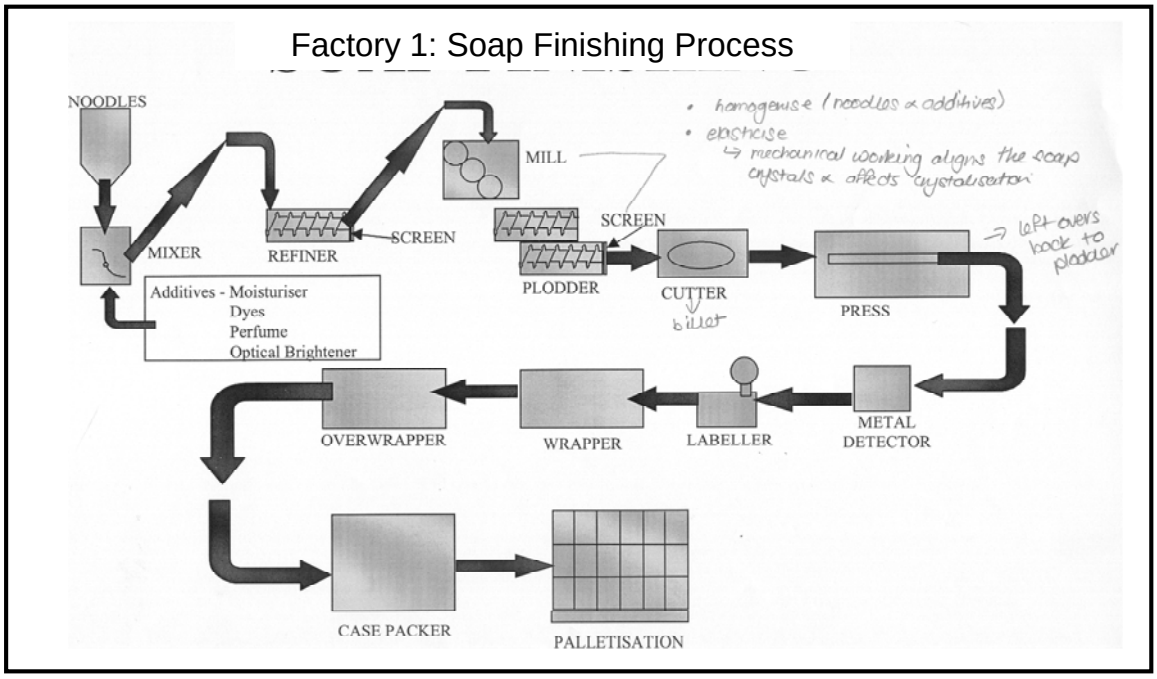
Stages of purchasing sophistication

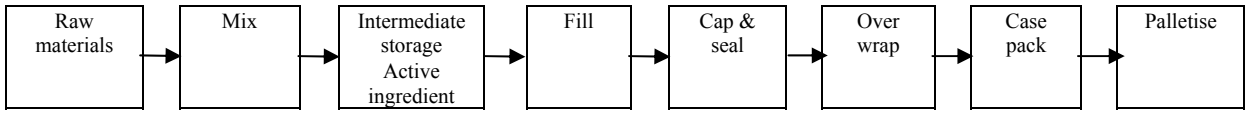
Procurement focus	Main tasks	Required information	Decision level
Strategic items	Accurate demand forecasting. Detailed market research. Development of long-term supply relationships. Make-or-buy decisions. Contract staggering. Risk analysis. Contingency planning. Logistics, inventory, and vendor control.	Highly detailed market data. Long-term supply and demand trend information. Good competitive intelligence. Industry cost curves.	Top level (e.g., vice president, purchasing).
Bottleneck items	Volume insurance (at cost premium if necessary). Control of vendors. Security of inventories. Backup plans.	Medium-term supply/demand forecasts. Very good market data. Inventory costs. Maintenance plans.	Higher level (e.g., department heads).
Leverage items	Exploitation of full purchasing power. Vendor selection. Product substitution. Targeted pricing strategies/negotiations. Contract/spot purchasing mix. Order volume optimization.	Good market data. Short- to medium-term demand planning. Accurate vendor data. Price/transport rate forecasts.	Medium level (e.g., chief buyer).
Noncritical items	Product standardization. Order volume monitoring/optimization. Efficient processing. Inventory optimization.	Good market overview. Short-term demand forecast. Economic order quantity inventory levels.	Lower level (e.g., buyers).

Classifying purchasing materials requirements

Appendix 11: CleanCo: Manufacturing Processes







Factory 1: Aerosol Production Process

Appendix 12: CleanCo: Order Allocation, Pick & Despatch Process

Step1: ***Allocation***

- Two types of orders:
  - Those that aren't booked in (normally the haulier, though get involved on one or two of the majors)
  - Some are pre-booked (that date, that time)
- Work on an 11-day window (real not working days)
- Run a daily allocation report that tells them the number of
  - Lifts - 2x13
  - Weight
  - Day needs to be booked in
- Look at allocation report, which tells you all the orders that could be released
- New orders are not released until they have been allocated
- Cherry pick off e.g. don't allocate stock to field sales as see that Asda want it. Can then phone them. Don't usually make a fuss, as they only want it at a price.
- Need to have a 'feel' for allocation, which has been built up through experience.
- To do this you need to know the customers. A lot of it is experience and knowing how to read reports e.g. If we have an order for some stock, but know that there is no stock at Farnworth, at the order processing or allocation stage we can arrange for it to be met from another warehouse or the factory
- Pallet configurations change and make it difficult to order in full pallet quantities. Had a lot due to bottle changes.
- Some of the depots have strict rules, and might reject if not a full pallet quantity so it is important to stay abreast of these changes.

Step 2: Assign weigh bill numbers

- Each customer is set up against a carrier (used to have 8 or 9)
- Some carriers used to go through depots (Scotland, NE and Midlands)
- Used to do a weigh bill run. Would bulk together orders for 10 customers. Pick as bulk. Send to regional depot, where they are then picked.
- Moving to direct deliveries
- Still get a weigh bill number for direct deliveries as that is the trigger to produce a dispatch note
- Produces one weigh bill number per carrier (per day?)

Step 3: Produce despatch note & pick orders

- Despatch note comes off, the yellow copy is the one they pick from. Can pull off a pick list, but never used it.
- Yellow copies are put into pigeon holes for picking, white notes go to one side to get ready for the driver the day before collection
- Pick until there are no more to pick
- Look out 11 days, but 80% of deliveries are made within 3-4 days
- 'How many yellows got today' – everything measured in yellows
- Moves quite quickly
- One yellow per customer/delivery

Step 4: Despatch

- If local may carrier collects on the day of delivery but usually pick up stock on the previous working day
- Wagon arrives
- Comes into the office, CS staff check if ready
- If they are get them to check paperwork
- Put the yellows that have been picked into a box
- Goes into a bay
- Loader picks up the yellow. Yellow has reg and location.
- Finds load, and loads it.
- Driver takes away piece of paper from office and checks number of pallets. Then check against dispatch paperwork.
- Already sign with paperwork. Then give paperwork.
- If there is a discrepancy need to go out check why
- Curtain-siders everything here
- Not meant to close curtains till checked
- Shouldn't sign paperwork until checked and loaded
- Person loading should check the load
- The drivers even sign in: 'This driver has signed 15 pieces of paper'

Appendix 13: CleanCo: Inhibitor Analysis

Type alignment	Schein Categorisation	Factor	Sub-factors	Example
Cultural alignment	Assumptions / artefacts	Maintain status quo	Decisions not openly challenged…ignore them and they go away	'That's the way we've done it attitude' (GCHh #4) 'Culture mismatch – try new things at board level, but don't want to change at lower levels' (GCHh #4) CleanCo culture was 'If I leave things alone for long enough it will go way' (MJ #12) People have entrenched views of what their job is and do not feel responsible to work past their contracted hours to complete a task, or to expand the scope of their job past their job description (DD #26) 'There is a tendency to do things as they have always been done' (DD #26) 'Stuck in functional silo's' (MJ #12)
Cultural alignment	Assumptions / artefacts	Fear of failure	Mistakes are punished	'Fear of failure' (GCHh #4) 'Mistakes are career limiting (DA#7)
Strategic alignment	Artefacts	Inappropriate group boundaries	Tension with group and operating company	'2 masters, the group and the UK' (PM #15) CIL is a different culture again, 'the them and us is too strong' (GCHh #4) The introduction of global brands has caused some tension between CIL and CleanCo (JW #23)
Strategic alignment	Artefacts	Inappropriate group boundaries	Initiatives don't permeate beyond board level	'The management team are on board, but whether they are influencing the operators in the right way is still questionable. The operators are still very output focused' (DC #16) Top-level management focus on site is cash, but at the middle management and shop floor level the focus is output. (DC #16)
Cultural alignment	Artefacts	Sub-cultures	Sub-culture	'Staff in the aerosols work as a team far more than bar soap people' (DC #16) Aerosols very much see themselves as team players, culture in bar soap 'this is my job and I don't do anything else' (PT #17)
Internal alignment	Artefacts	Inappropriate group boundaries Strong personal relationships within silos	Tension between centralised and decentralised functions	Logistics don't bolt, gel or combine with site very well because they feel affiliated to head office (PM #15) Having centralised functions can be very difficult e.g. Purchasing, if there is a quality issue (PM #15)
Internal alignment	Artefacts	Inappropriate group boundaries	Disconnect between those responsible for input and the output of data	Used to run a very good vendor performance system, but when moved all the ordering to site (logistics), it was not as controlled as when it was done by purchasing. There were delays in updating the system, which meant that the purchasing team needed to interrogate the system manually (ES #21).
Strategic alignment	Mechanism	Performance measurements lacks business focus	Lack of business focus	'Seems a shock to people that CleanCo is here to make a profit, not just to serve the employees' (DD #26) 'A lot of people in this organisation have never worked outside the organisation have never worked outside the business, and have no real cash awareness' (PM #15)
Internal alignment	Artefacts	Lack of consensual definition	Coding – same words, different meaning	When doing the 2nd iteration of the business integration process, have found that we were not talking about the same things (PB #5)
External alignment	Mechanism	Performance measurement lacks customer focus	Misuse of information	The trade misuses stock shortage information, by over ordering to ensure they maintain supply, therefore try to be discrete about shortages (BB #2)
External alignment	Artefacts	Strong personal relationships with suppliers	Strength of relationships	If everyone buys into and owns the supplier as a team, there can be strong resistance if the supplier needs to change. How do you manage this? (GCHh #4)
External alignment	Mechanism	Performance measurement lacks customer focus	KPIs not aligned with the customer	A lot of the measures are introspective, and only a relatively small number are customer focused. This is expected to increase, as there is a move from measuring performance at product rather than factory level (DA #7)

Type alignment	Schein Categorisation	Factor	Sub-factors	Example
Internal alignment	Mechanism	Performance measurement has different units of measure	Different units of measure	OEE by manufacturing managers, operators count cases and accounting want it in dozens (DC #16)
Internal alignment	Artefacts	Inappropriate group boundaries	Tension between marketing and manufacturing	Have a concern that sales and marketing think that manufacturing is totally flexible and don't realise the constraints (GT #8) Historically CleanCo was a very marketing driven company and marketing drove all NPD activity even if it was at manufacturing's expense (LU #9) Increase the product margin, and get a way from the marketing wish list (MJ #12) 'CleanCo are let down by their back end processes and efficiency of the factory' (DC #20) Recently there has been a move to rationalise shower gel bottles from 3 to 1, production would like to do this with other bottles, but marketing like a point of difference' (ES #21)
Internal alignment	Artefacts	Inappropriate group boundaries Functional specialists	Tension between logistics and manufacturing	Manufacturing expect rate reductions to be implemented immediately, but are less quick to increase the rates even if the demonstrated performance suggests that they should be increased. Causes problems for logistics as manufacturing are then continually running ahead of plan (DC #16) Logistics say this is how we want to plan it, but production want to do it a different way e.g. if production change the line that an order is scheduled down, this creates a lot of work for logistics to re-schedule. It is importantly as MFG uses the WOs to calculate work centre efficiencies. (DC #16)

Total: 15 sub-factors, 11 factors

CleanCo – Inhibitor analysis to develop a conceptual model of assumptions, mechanisms and artefacts

Appendix 14: CleanCo: Enabler Analysis

Alignment type	Schein categorisation	Factor	Example
Cultural alignment	Overarching	Changing behaviour and hence the assumptions upon which the business is based	'A main objective about the business integration process is about changing behaviour' (PB #5)
Internal alignment	Assumptions Artefacts	Joined up thinking Appropriate group boundaries	'The ability to link functions and for everyone to think beyond their own role' (DD #26) Moved to a point that now 'concerned that we could be optimising heads on site, not for the entire supply chain' (GT #8) 'Run the business as a business not as a series of functions' (PB #5) 'Am I thinking logistics or am I thinking business wide' (PB #5)
Internal alignment	Mechanisms	Business focus	'It's about linking strategy and tactics at the coalface' (PB #5)
Internal alignment	Mechanisms	Visibility	'To change the culture you need to make things visible, and this can be a bit painful' (MJ #12)
Cultural alignment	Assumptions	Good to challenge	'The ability to challenge and think beyond your role and historical way of doing things' (DD #26)
Internal alignment	Assumptions Mechanisms	Joined up thinking Customer focus	'It is important to make brand objectives dovetail into the customer plans otherwise you lose the brand', 'The soapbox shouts value, in line with the ValCo value proposition' (DS #11)
Internal & external alignment	Artefacts	Flexibility	Flexible manufacture through standardisation and postponement, so you only need to clean the parts that dose colour and perfume' (MJ#12) Have quite a few product launches coming up that are more niche, gives better flexibility externally, with customers e.g. ValCo only want value added products (MJ #12) Constantly looking for flexibility in the system (PM #15)
Internal & external alignment	Mechanisms	Customer focus	CleanCo have set up a dedicated production line for customer X (ML #13). Supports views of focus from a manufacturing perspective (Skinner, 1974) and organisational perspective (Thompson, 1967)

Total: 7 factors

CleanCo – Enabler analysis to develop inhibitor analysis

Appendix 15: 4PLElecCo: Summary of Primary Data

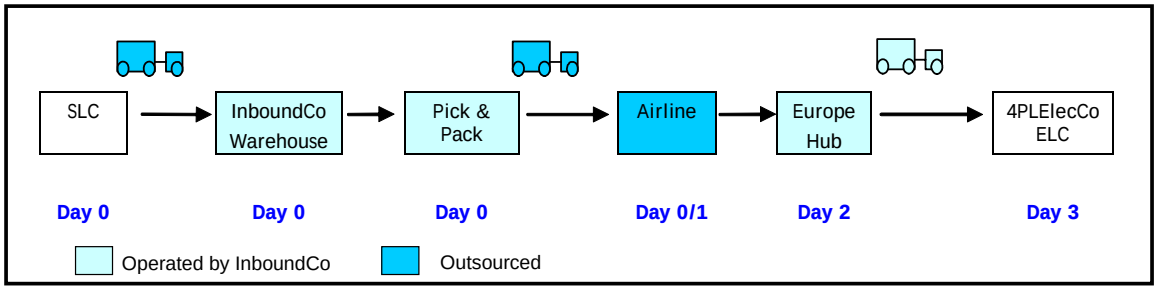
Contact Notes

Ref	Company	Interviewee	Date	Description	Transcribed
#01	4PLElecCo	FH ElecCo EMEA logistics	07/05/02	Scoping Study	No
#02	ElecCo	EdB EMEA Operations manager	07/05/02	Scoping Study	No
#03	4PLElecCo	CKr / RvA Operations manager	29/05/02	Interview	No
#04	4PLElecCo	OV ElecCo account manager	29/05/02	Interview	Yes
#05	4PLElecCo	KG ElecCo transport manager	29/05/02	Interview	Yes
#06	4PLElecCo	CH ElecCo customer service manager	30/05/02	Interview	Yes
#07	InboundCo	CK Regional account manager	18/05/02	Interview	Yes
#08	Outbound1Co	TS Strategic account manager	11/06/02	Interview	Yes
#09	ElecCo	AR Client services logistics program manager	19/06/02	Interview	Yes
#10	Outbound2Co	ED Global account manager	26/06/2002	Interview	Yes
#11	Outbound3Co	CdL Key account manager, Holland	26/06/2002	Interview	Yes

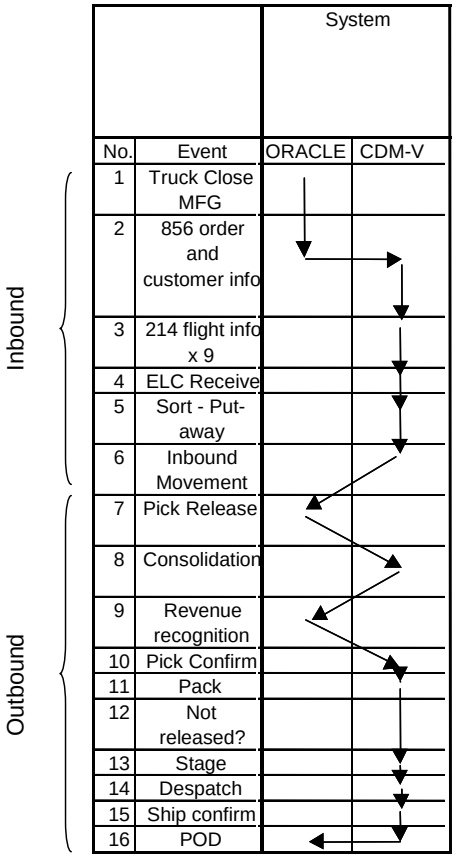
Personal Notes

Ref	Company	Description	Interviewee
26-02-2001	4PLElecCo	Telephone conversation	IC
14-06-2001	4PLElecCo	Exploratory meeting	NV
01-11-2001	4PLElecCo	Telephone conversation	FH
07-05-2002	4PLElecCo	Research context – 4PLELECCO Overview notes	FH
	ElecCo	Project Proposal Objective Review Meeting	EdB
	ElecCo	Research context – ElecCo Overview notes	EdB
	4PLElecCo	Orientation visit meeting	CH
	4PLElecCo	Research context – Overview of operations	CH
	4PLEleco	Warehouse Tour	CH
22-07-2002	OptOutCo	Customer visit notes	LK

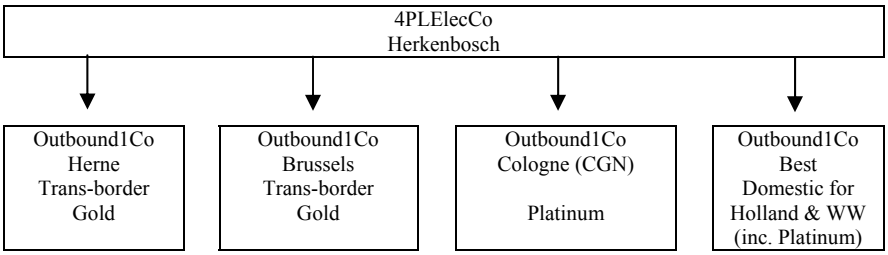
Appendix 16: InboundCo: Inbound process


SLC
InboundCo Warehouse
Pick & Pack
Airline
Europe Hub
4PLElecCo ELC
Day 0
Day 0
Day 0
Day 0/1
Day 2
Day 3
Operated by InboundCo
Outsourced

Appendix 17: 4PLElecCo: ELC process steps for standard cartons


System
No.
Event
ORACLE
CDM-V
1
Truck Close MFG
2
856 order and customer info
3
214 flight info x 9
4
ELC Receive
5
Sort - Put-away
6
Inbound Movement
7
Pick Release
8
Consolidation
9
Revenue recognition
10
Pick Confirm
11
Pack
12
Not released?
13
Stage
14
Despatch
15
Ship confirm
16
POD
Inbound
Outbound

Appendix 18: Outbound1Co: Key attributes of deliver process



Direct feed model

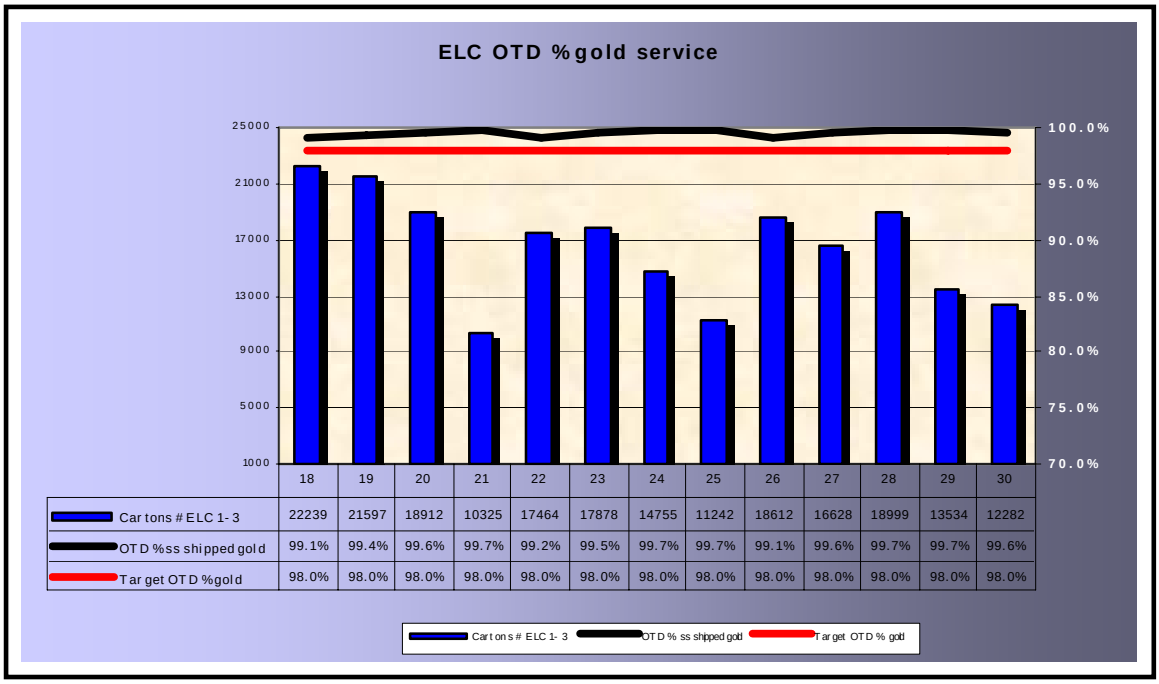
- Herne – 2 containers/day
- Best – 1 container/day
- Cologne – 1 container/day
- Brussels – 1 container/day

Container requirements

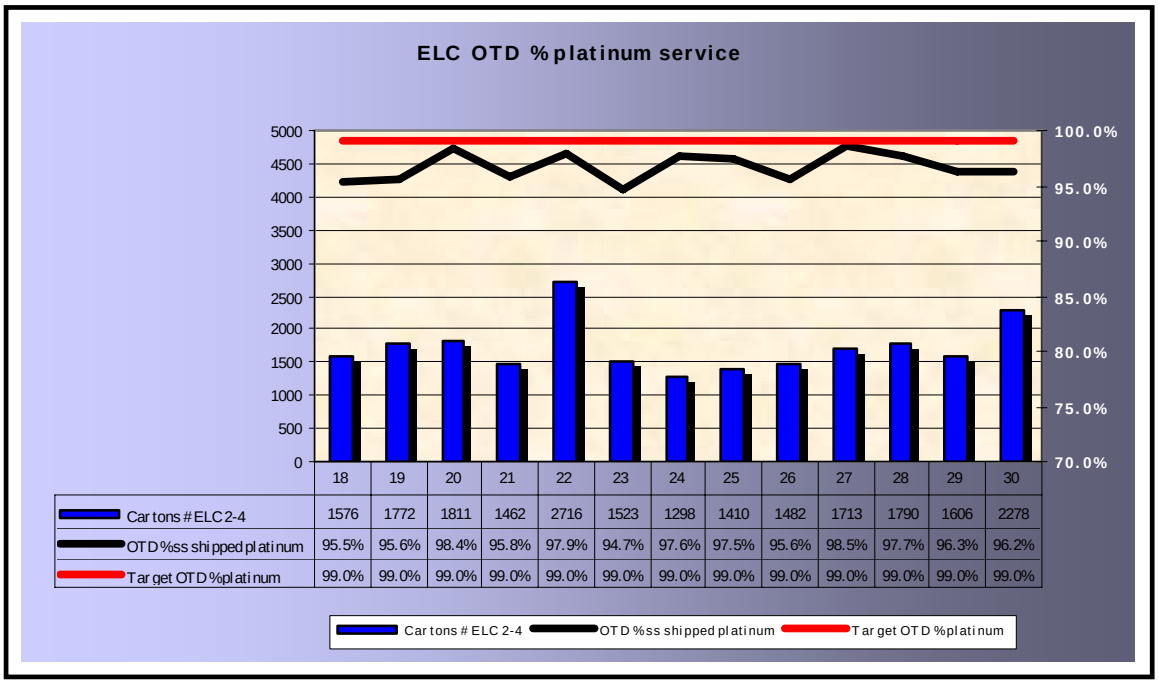
Destination countries	Gold			Platinum		
	Packages	Service level	Routing	Packages	Service level	Routing
Sweden	212	Transborder	Herne Night	37	Transborder	CGN
Finland	93	Transborder	Herne Night	17	Transborder	CGN
Denmark	145	Transborder	Herne Night	25	Transborder	CGN
Norway	71	Expedited	Centre Best	16	Worldwide	Centre Best
Germany	1198	Domestic	Herne Night	101	Transborder	CGN
Netherlands	305	Domestic	Center Best	32	Domestic	Center Best
Belgium	104	Transborder	Brussels Night	18	Transborder	CGN
France	372	Transborder	Brussels Night	69	Transborder	CGN
England	457	Transborder	Brussels Night	142	Transborder	CGN
Spain	109	Transborder	Brussels Night	33	Transborder	CGN
Portugal	28	Transborder	Brussels Night	3	Transborder	CGN
Italy	384	Transborder	Brussels Night	37	Transborder	CGN
Austria	69	Transborder	Herne Night	6	Transborder	CGN
Ireland	30	Transborder	Brussels Night	7	Transborder	CGN
Luxembourg	13	Transborder	Herne Night	3	Transborder	CGN
Switzerland	40	Expedited	Centre Best	12	Worldwide	Centre Best
Greece		N/A		9	Transborder	CGN
Non EU	14	Expedited	Center Best	79	World Wide	Best
All other EU	54	Transborder	Herne Night	12	Transborder	CGN

Volume Plan

Appendix 19: On Time Delivery (OTD) performance for Platinum and Gold Services



	18	19	20	21	22	23	24	25	26	27	28	29	30
Cartons # ELC 1-3	22239	21597	18912	10325	17464	17878	14755	11242	18612	16628	18999	13534	12282
OTD %ss shipped gold	99.1%	99.4%	99.6%	99.7%	99.2%	99.5%	99.7%	99.7%	99.1%	99.6%	99.7%	99.7%	99.6%
Target OTD %gold	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%



	18	19	20	21	22	23	24	25	26	27	28	29	30
Cartons # ELC 2-4	1576	1772	1811	1462	2716	1523	1298	1410	1482	1713	1790	1606	2278
OTD %ss shipped platinum	95.5%	95.6%	98.4%	95.8%	97.9%	94.7%	97.6%	97.5%	95.6%	98.5%	97.7%	96.3%	96.2%
Target OTD %platinum	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%

Appendix 20: Request date vs. promise date analysis for OptIn1Co and OptIn2Co

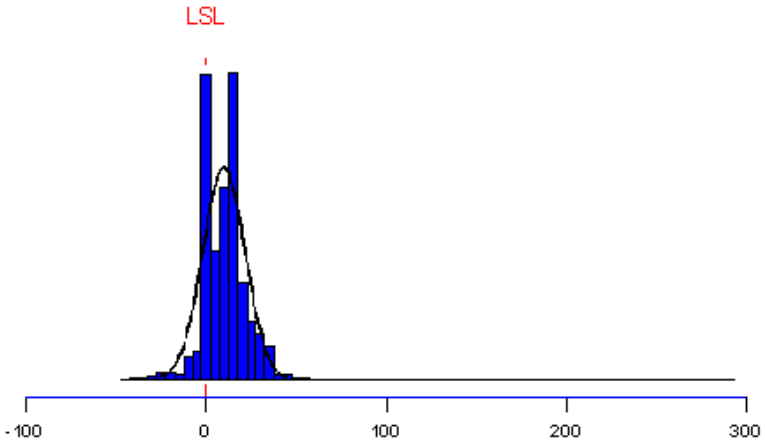
OptIn1Co

0.7% orders promise date < request date

99.3% orders promise date > request date

Process Data	
USL	*
Target	*
LSL	-0.0100
Mean	10.0703
Sample N	5916
StDev (Overall)	11.7836

Overall Capability	
Pp	*
PPU	*
PPL	0.29
Ppk	0.29
Cpm	*



Observed Performance	
PPM < LSL	72008.11
PPM > USL	*
PPM Total	72008.11

Expected Performance	
PPM < LSL	196149.78
PPM > USL	*
PPM Total	196149.78

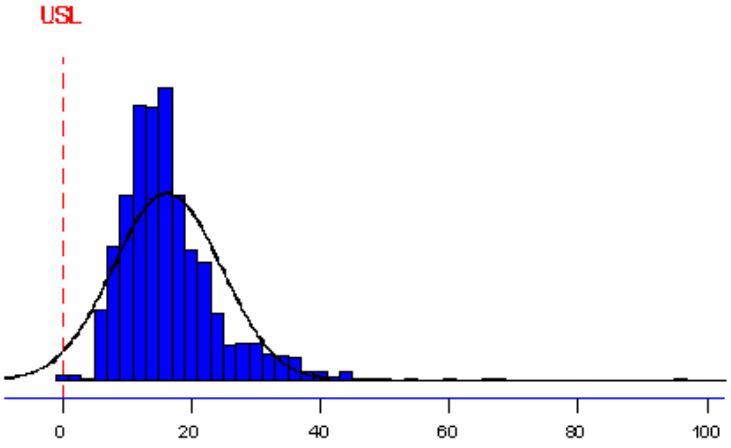
OptIn2Co

0.3% orders promise date < request date

99.7% orders promise date > request date

Process Data	
USL	0.0000
Target	*
LSL	-0.0000
Mean	16.3371
Sample N	2507
StDev (Overall)	8.41401

Overall Capability	
Pp	0.00
PPU	-0.65
PPL	0.65
Ppk	-0.65
Cpm	*



Observed Performance	
PPM < LSL	0.00
PPM > USL	997606.70
PPM Total	997606.70

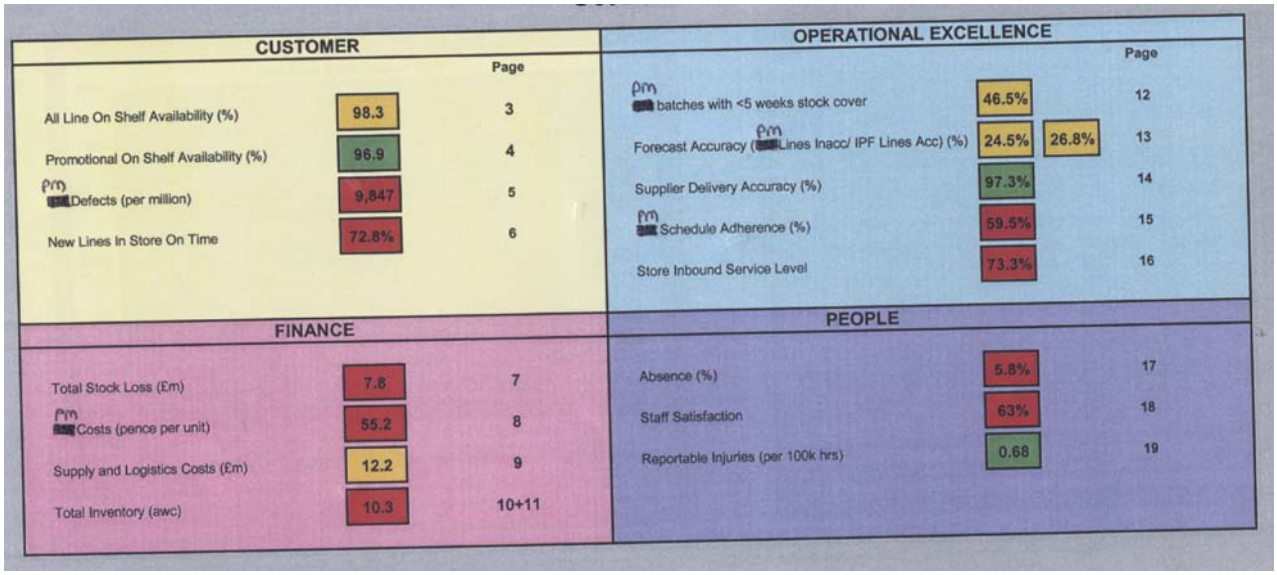
Expected Performance	
PPM < LSL	26089.68
PPM > USL	973910.17
PPM Total	999999.86

Appendix 21: PharmaCo: Summary of Primary Data

Contact Notes

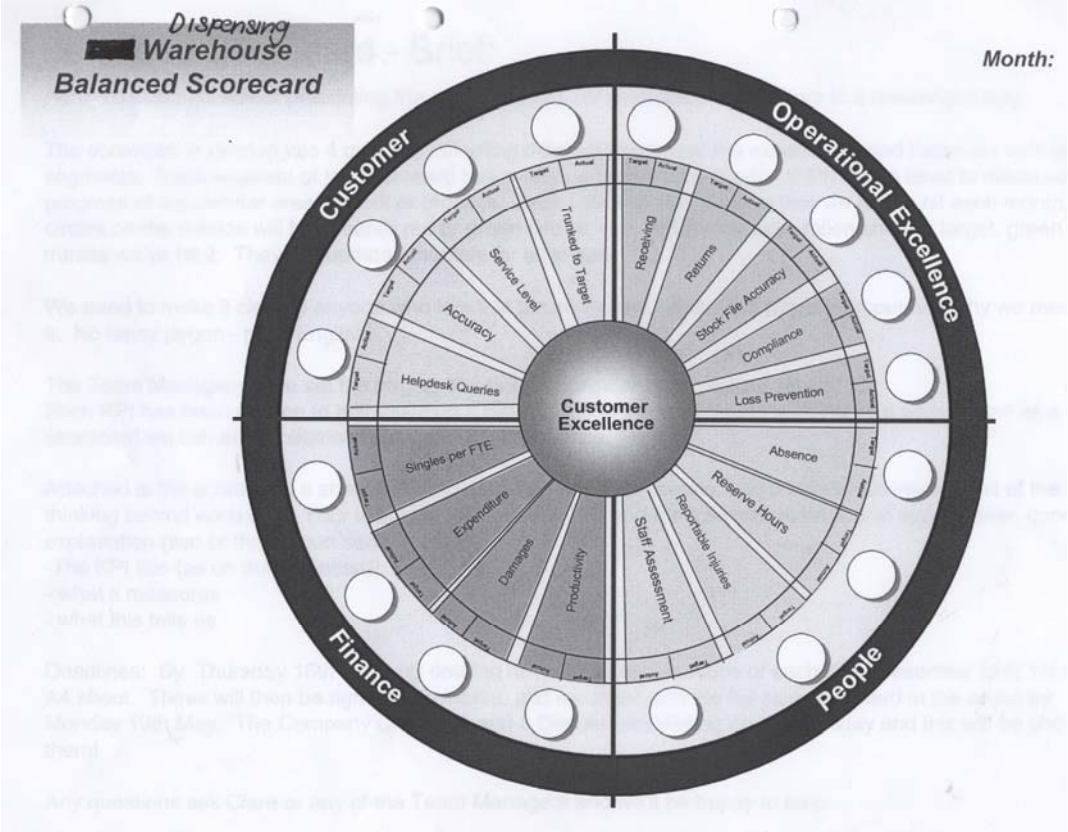
Ref	Company	Interviewee	Date	Description	Transcribed
#01	PharmaCo	MC Logistics Infrastructure Manager	16/09/03	Scoping Study	No
#02	PharmaCo	PB Executive Director - Operations	16/09/03	Interview	Yes
#03	PharmaCo	PM SC Transformation Director	16/09/03	Interview	Yes
#04	PharmaCo	DL Dispensing Category Manager	30/10/03	Interview	Yes
#05	PharmaCo	MK Head of Supply	02/10/03	Interview	Yes
#06	PharmaCo	CB HR Manager	13/10/03	Interview	No
#07	PharmaCo	TG Dispensing Supply Manager / Buyer	13/10/03	Interview	Yes
#08	PharmaCo	JU Dispensing warehouse manager	02/10/03	Interview	Yes
#09	PharmaCo	SE Pharmacy Superintendents Office	02/10/03	Interview	Yes
#10	PharmaCo	SM DC Group Manager	04/12/03	Interview	No
#11	PharmaCo	AD DC Unit manager	04/12/03	Interview	No
#12	PharmaCo	AR Pharmacy Manager, High street store	02/02/04	Interview	No
#13	PharmaCo	JM Store Manager, High street store	02/02/04	Interview	No
#14	PharmaCo	ZS Pharmacy Manager, Out of town store	17/02/04	Interview	No
#15	PharmaCo	MW Store Manager, Out of town store	17/02/04	Interview	No
#16	MedLogCo	MS PharmaCo account manager	20/02/04	Interview	No

Appendix 22: PharmaCo: Balanced Score Card Quantitative Summary and Guide to Monthly Report



PharmaCo Supply Chain: Key Performance Indicators (October 2003)

Appendix 23: PharmaCo: Dispensing Warehouse BSC



Dispensing Warehouse BSC – Visual Summary

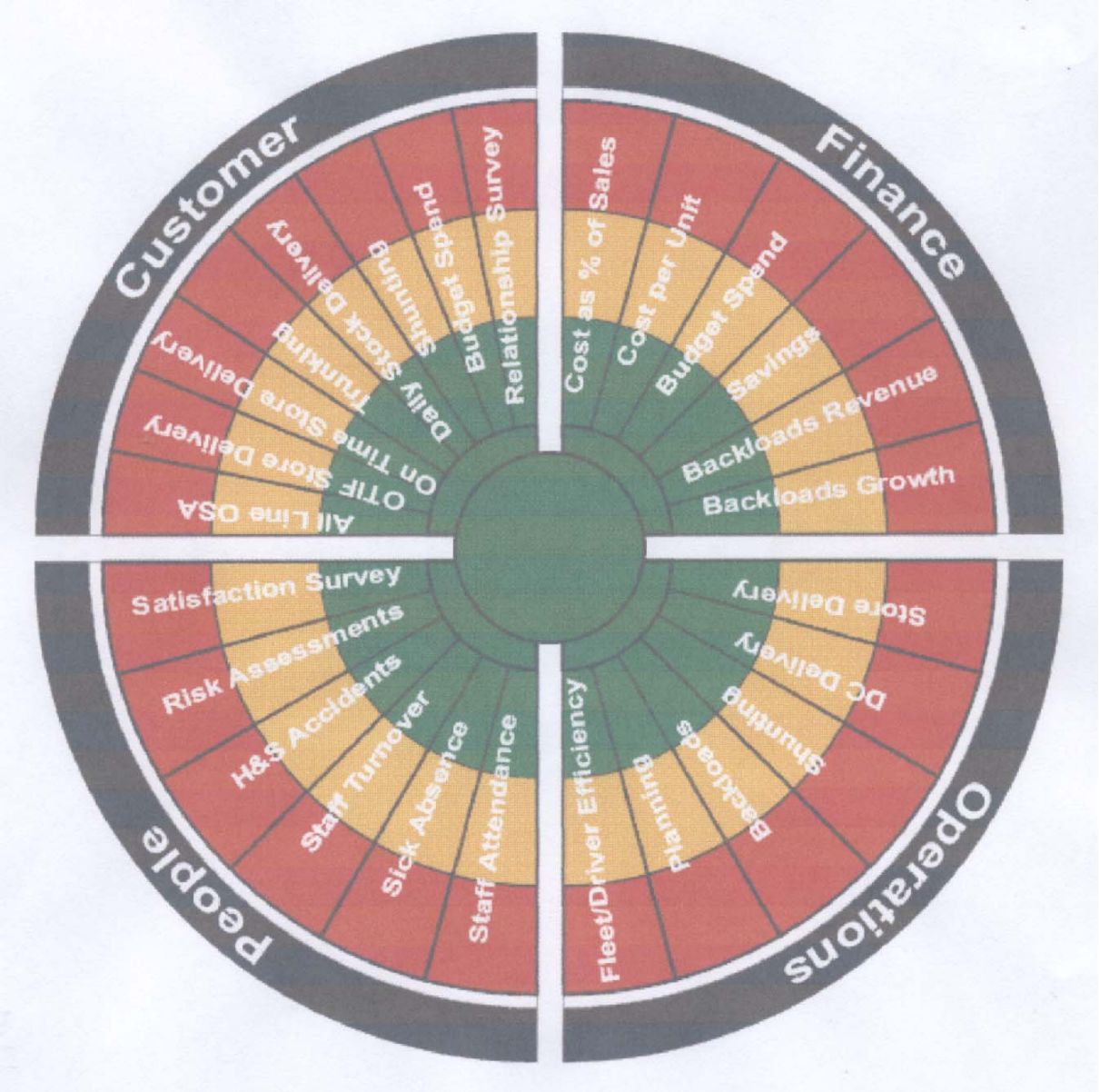
[redacted] Balanced Scorecard - Dispensing Warehouse

To be updated monthly (but data collected weekly)

	Scorecard Measure	Targets	Definitions	Source	2003 April	May	June
Customer	Trunked to target	96%	Left [redacted] +/- 15 mins of OPAL despatch target	Weekly report	64%	71.7%	77.1%
	Service level	99.5%	Service level to stores in singles sent	Weekly report	99%	99.0%	99.7%
	Accuracy	<0.5% errors	Weekly average of pick accuracy	Weekly report	0.3%	0.7%	0.4%
	Helpdesk Queries	0.5%	Queries per store per week	Weekly report	0.14	0.08	0.13
Finance	Singles per FTE	>8000	Singles output per FTE	Weekly report	7709	8467	8,155
	Damages	<£17k	Damages £ monthly	PI team monthly	£ 15,177	£ 4,793	1,453
	Expenditure	< budget	£ spent versus budget, monthly and YTD	DW [redacted]	£ 449		454,946
	Productivity	?	tbc awaiting measures	tbc			
Operational Excellence	Returns	<200 totes / day	< 200 totes outstanding / day.	Weekly report	594	133	204
	Receiving verification	100%	100% of stock delivered received in a day	Weekly report	100%	98.00	98.75
	Loss Prevention	KPI	Meet company searches KPI monthly	BK [redacted]	MET	NOT MET	
	Stock File Accuracy	1%	% adjusted relative to lines stockholding	BD [redacted]	2.93%	1.91	1.79%
	Compliance		Compliance with H&S and MCA audits	BE [redacted]	MET	MET	
People	Absence	5%	Weekly staff absence level	Weekly report	4.12	5.59	5.47
	Reserve hours	< 192 hrs	Number of reserve hours used per week	Weekly report	122	168	120
	Reportable injuries	2 / yr	RIDDORs (4 or more days absence due to injury)	Weekly report	1	1	2
	Staff Assessment	100%	% of assessments done within 12 month rolling period	MC [redacted]			

Dispensing Warehouse BSC – Detailed Summary

Appendix 24: TruckCo BSC



TruckCo BSC – for quarterly review with PharmaCo